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PULSATING EXOPHTHALMOS[1]

LIGATURE OF THE COMMON CAROTID, EXTERNAL CAROTID, AND SUPERIOR THYROID ARTERIES

BY JOSEPH RANSOHOFF, M. D., CINCINNATI, OHIO

THERE are few surgical conditions in which the clinical diagnosis is so self-evident as in pulsating exophthalmos. Considered from the viewpoint of its ætiology, the pulsating bulbar protrusion is only one, if even the chief, of the end-results of diverse pathological beginnings. Since the disease has rarely been allowed to proceed to its natural termination, sloughing of the eyeball and eventually death from infection or from hemorrhage, the opportunities for autopsy study of the underlying conditions have been relatively few.

According to Harlan (1), in eighteen post-mortems there were found one post-orbital aneurysm of the ophthalmic artery, one aneurysm of the carotid artery in the cavernous sinus, four dilatations of the artery in the sinus, three wounds of the artery in the sinus, five thromboses of the cavernous sinus and ophthalmic vein, two dilatations of the sinus and ophthalmic vein, one pressure on the sinus by growth from without, and one of both ophthalmic arteries (doubtful).

According to Wilder (2), in twenty-four autopsies made up to 1890 there was a traumatic or spontaneous rupture of the internal carotid within the sinus in seven; in four there was an aneurysmal dilatation of the artery without rupture; in six clinically characteristic cases no lesion of the carotid was found; in one there was an intracranial aneurysm of the ophthalmic; in four cases, vascular retrobulbar tumors were found, and in two of these the growths came from within the skull cavity. While it is hardly in accord with scientific nomenclature to designate a disease by any one symptom, no matter how prominent, it is evident that until the methods of determining the underlying pathological conditions are improved there is every reason for retaining the term "pulsating exophthalmos." There is assuredly reason enough for cutting short the tendency to substitute the term "arteriovenous aneurysm," since in nearly fifty per cent of the autopsy reports such a condition was not found.

The clear history of trauma, or of some violent effort and sudden onset of symptoms, is valuable in establishing the aneurysmal nature of the individual case. Such a history has been elucidated in about sixty per cent of all cases. Paralysis of the abducens, supervening early from the very nature of things, speaks in favor of aneurysmal disease and rupture.

In very exceptional cases the exophthalmos has been bilateral, a condition to account for which an injury of both carotids has been assumed to exist. As a rule, in these cases the disease extends from one orbit to the other after a long interval. The circular sinus of Ridley connecting the two cavernous sinuses easily accounts for the extension of the venous dilatation from side to side. Furthermore, I know of no case in which the autopsy report showed involvement of both carotid arteries.

The literature of the subject amply shows

[1] Read before the American Surgical Association, Cleveland, Ohio, May 30, 1906.

that a spontaneous cure through the organization of a thrombus is possible. At least ten cases of complete cure had been recorded up to 1890. Wilder has had one case under observation for thirteen years, the patient doing the hard work of a switchman.

The surgical treatment of pulsating exophthalmos has been practically reduced to the measure of tying the common carotid artery, to the exclusion of every other procedure, although within the past two decades improvements and even cures have been reported from digital compression by Despaquet (3), Walker (4), and Kipp (5). In most of the cases, however, compression failed of results. As a last resort, or as supplementary to tying the carotid, an excision of as much as possible of the varicose vessels has been practised in a comparatively small number of cases.

In 1899, Bodon (6) collected 58 traumatic cases in which the carotid of one side had been tied. Of this number, 26, or 46 per cent, were cured; 20, or 35 per cent, improved; unimproved, 6, or 10 per cent; and died, 6, or 10 per cent.

From the literature of the last seven years I have been enabled to collect reports of 21 cases, including my own, in which the common carotid was tied. Of these, 14 were reported as cures. In 5, the cures were partial, or there was a recurrence. In only one case death followed the operation (7). The case of Barna and Rugby ended fatally, from cerebral abscess following a bullet wound. In addition to the six cases quoted by Bodon, in which both carotids were tied for exophthalmos, and all of which recovered, two others have been reported, one by Lilienthal (9), which was followed by failure, and one by Hansel (10), in which death followed from convulsion.

The comparative harmlessness of tying the common carotid has been amply established. The danger of secondary hemorrhage from the wound has been practically eliminated, as has that from sepsis. The only factor with which we cannot deal is the unilateral cerebral ischæmia. I have had the misfortune to lose a patient from coma and hemiplegia, in whom a prophylactic ligation of the external carotid was attempted preliminary to the removal of an enormous tumor of the jaw. The patient never regained consciousness. The autopsy revealed a high division of the carotid, the superior thyroid springing from the common carotid, and the ligature tied about the latter above the origin of the thyroid. Seaman (11) reports a hemiplegia which continued for years.

The failures, partial cures, and recurrences which have followed tying the carotid alone have resulted from too rapid return of the anastomotic circulation. For at least seventy years (Blackman)—(12)—the importance of the inferior and superior thyroid arteries in hastening the back flow by means of the external carotid into the internal has been recognized. For this reason, in the case to be reported I followed the plan of Legouest (13), of tying not only the common and external carotids, but also the superior thyroid. While it is not improbable that the tying of these three vessels at one sitting has been done before for internal carotid aneurysm, I have not found the record of it. The whole operation can easily be done through one incision. What little danger there is from secondary hemorrhage at the site of operation is minimized by this procedure.

Case. Robert D., aged 22, farmer. Entered the Jewish Hospital February 3, 1906. Was referred by Dr. Vail. Father and mother both living; three brothers and two sisters living and well. The patient had one attack of appendicitis in 1895, but has had no recurrence. Was perfectly well until the onset of the present trouble. This began shortly after a fall sustained on the 18th of October, 1905, which resulted from a slight blow on the head during an altercation. The blow was delivered over the right temple, and was followed by an attempt at gouging the eyeball from its socket. This happened about four P. M. The patient was not rendered unconscious or dizzy. He walked home, and felt well until about four hours later, when he began to vomit. The vomiting lasted only a short time. He had no further evidence of anything wrong until the 28th of November, when he suddenly noticed that he was unable to see out of his right eye, and that the eye became very much reddened and swollen. From this time forth the eyeball became more and more prominent, until within two weeks of the onset of symptoms he was unable to close the lids. Occasionally he suffers from pain in the forehead, but he suffers mostly from ringing, buzzing, and blowing noises in his head.

Physical Examination. Well-developed male. Well, except for condition of his right eye, which projects between the palpebral fissure. The conjunctiva is intensely reddened and of uniform velvety appearance. The cornea is in a marked depression formed by the

rim of the conjunctival attachment. The cornea is clear. There is an absolute paralysis of the abducens. Over the inner portion of the upper lid, and in the supraorbital territory, extending for about two inches above the ridge, there is a distinct pulsating swelling. It is evidently expansile, and on auscultation presents a loud, rasping bruit synchronous with the cardiac systole, and disappearing entirely on compression of the carotid artery in the neck. There is no discoloration of the skin. The upper lid, the eyeball, and the swelling above alluded to are exquisitely sensitive to the touch. According to Dr. Vail, the ocular media are perfectly clear. The veins are shown to be about three or four times their normal size, and occasionally are seen to pulsate. I am indebted to Dr. Vail for the accompanying diagram of the ophthalmoscopic picture.

The general condition of the patient is normal, although his rest is very much disturbed by reason of the continuous noises, which are particularly annoying when the patient lies down. What sleep he gets is in a semirecumbent posture.

Diagnosis. Arteriovenous aneurysm of the internal carotid, traumatic in character, with rupture of the abducens.

Operation. February 7, 1906. Gas-ether anæsthesia. Incision four inches long, along the entire border of the sternocleido. Exposure of the carotid sheath at point of election and division of the common artery between two catgut ligatures. Exposure further upward of the external carotid artery and of the superior thyroid artery. Ligation of the external carotid between the facial and the superior thyroid. Division of the superior thyroid between two ligatures. After closing the incisions in the arterial sheaths with fine catgut, the wound was closed with buried sutures and skin-clamps. The patient left the hospital seventeen days after the operation. There was no recurrence of the pulsation. The eyeball had receded very much, although not entirely. The conjunctival chemosis had entirely disappeared, so that, except for a considerable number of tortuous veins, the sclerotica presented an almost normal appearance. The paralysis of the external rectus continued as before the operation. I saw this patient three months and a half after the operation, and his condition remained unchanged, except for a recession of the exophthalmos and a yet closer approach to the normal appearance of the sclera. The abducens paralysis persists. There is no pulsation in either the temporal or facial artery of the affected side. According to Dr. Vail, the vision has improved very much, although there still remains a very marked tortuosity and distention of the intraocular veins. Along the inner portion of the supraorbital ridge there is a slight depression, as from absorption of bone. An effort to demonstrate this by radiograph failed. The patient is following his usual vocation, which necessitates work of the hardest kind.

Photograph of patient.

Addendum. In a note from Dr. Vail dated May 28, 1906, he writes that the large central scotoma, which the patient had before the operation, and which permitted him to see fingers only near the eye when held to one side, has disappeared. The neuritis from which the patient suffered has been completely recovered from, and the vision is now 20 20. He reads the finest print.

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MEDICO-MILITARY NOTES IN MANCHURIA[1]

By JOHN VAN RENSSELAER HOFF, A. M., M. D.

Colonel, Assistant Surgeon-General, United States Army; Military Observer with the Russian Forces in the Far East, 1905

THE Russo-Japanese conflict of 1904–05 has become a matter of history. With its causes, conduct, and political, sociological, or militant results we, as physicians, are not concerned, but, as such, we are immediately interested in its military sanitary conditions, management, and outcome, while remotely these can but deeply concern us in their application to our own military circumstances.

The remarkable sanitary results achieved by the belligerents in Manchuria have taught the world:

1. That there is no legitimate reason why, in war, the mortality from disease should exceed that from traumata.

2. That the extraordinarily large excess of deaths from battle-field injuries over those from disease, obtained for the first time in history, is directly due to the observance of well-established hygienic rules, proper sanitary organization, sufficient *personnel*, and adequate *matériel*, not to mention persistent fighting.

3. That, so far as known to me, this war has developed nothing new in medical treatment or surgical technique. Its one lesson for us is summed up in a single word, "*prevention*."

Without delving too deeply into statistics and burdening you with a mass of figures, I will here simply epitomize the official medical reports so far as known to the Russian military authorities at the date they were given to me in Harbin, October 2, 1905.

From the beginning of hostilities, February 10, 1904, to September 1, 1905, the hospital records account for 352,412 cases, exclusive of the killed and missing, and of the Port Arthur statistics, then unknown to the Russian authorities.

Of these cases, there —

Died	8,983
In hospital—Of disease, 4,790; of wounds, 3,008.	
In quarters—Of disease, 652; of wounds, 533.	
Discharged for disability	24,255
Transferred west of Baikal	120,394
Recovered	173,645
Remained under treatment	25,135
	352,412

The question will naturally be asked, What was the death-rate among the 120,394 "transferred" cases? I can only answer this by saying that in consultation with the statistical officer on September 18, 1905, he informed me that the total number of deaths from disease was then 18,830.

The foregoing table accounts for but 5,442; so we must assume, if my information and notes are correct, that 13,388 of the "transferred" cases died of disease. I have nothing to indicate how many of them, if any, died of wounds.

In other tables furnished me at the same time, there are noted 180,682 additional cases of battle-field casualties, of which there were—

Killed	19,467
Wounded	121,486
Missing	39,729
	180,682

Combining the two tables, we have 533,094 cases, of which there—

Died of disease	18,830
Died of wounds	3,541
Killed in battle	19,467
Missing	39,729
	81,567

The factor of the "missing" is a very large one in the problem of proportional losses.

The number of reported "missing" is extraordinary, nearly twice as great as the identified killed, and fivefold more than the Japanese reported "missing." In the German army, during the Franco-Prussian War, the proportion of the "missing" to "wounded" was about 1 to 5, whereas the Russians reported 1 to 3.

[1] Read before the American Surgical Association, Cleveland, Ohio, May 30, 1906.

When the circumstances of the conflict in the Far East are considered, it will be seen that the Russians were driven from every battle-field, and compelled to abandon their dead, which, in the absence of specific information as to death, they could but carry as "missing." It is not conceivable that many, if any, Russians deserted, as there was no place to desert to, except to the enemy, in which event they would have been reported, at least by name, to their own authorities, as in the case of other prisoners. So it would not be unreasonable to count all the missing as dead, which would give 62,737 dead from battle casualties to 18,830 from disease, or 3.3 killed to 1 death from morbific causes. It would, however, bring us well within the bounds of probability if we applied the German results to the proportion between the Russian killed and missing, 1 to 1.5, which would give, approximately, 37,642 killed and 25,095 missing, or almost exactly 2 killed to 1 dead from disease, which, at least until the statistics are crystallized, may be accepted as the probable ratio.

This gives approximately .62 missing to .95 killed to 3 wounded, which closely approaches the German ratio of .54 missing, .75 killed, and 2.83 wounded.

It is not probable that the Port Arthur statistics will affect this proportion, except as to "missing," of which there should have been but few, nor are they likely to change the relation between the number dead from disease and that from violence.

As the population is an essential factor in determining the rate of mortality, I will give such information as was obtainable during my tour in the Far East, it being understood that until peace was finally concluded, no secrets were more jealously guarded than those which might in any way convey to the enemy the strength of the opposing forces.

Kuropatkin, who, immediately preceding the outbreak of hostilities, was Minister of War, and certainly had every opportunity to know the facts, stated explicitly that Russia was wholly unprepared for war, and in fact at the time the Japanese made the naval attack at Port Arthur, "instead of concentrating troops, we [the Russians] were actually removing them thence." I have been informed that at the beginning of hostilities there were in the Far East less than a hundred thousand Russian soldiers. We know that the theater of operations was nearly six thousand miles from Russia, and that the single-track railroad connecting them was not completed, and was incapable of delivering more than two and a half trains daily. I quote further from Kuropatkin: "In spite of our [Russian] apparent superiority in number of battalions, we were numerically inferior to the enemy. Thus at Liao Yang, we had altogether 135,000 bayonets, at Sha-ho 145,000 bayonets, and at Mukden between 275,000 and 290,000 bayonets." Add to these figures 16 per cent to cover the other fighting arms, and we find that the Russian forces numbered at Liao Yang, 156,000; at Sha-ho, 168,200; and at Mukden, 336,400.

After their retreat from Mukden, there remained in the Far East altogether hardly 300,000 Russians. In the mean time the military mill at home had begun to grind rapidly, the railroad was completed and its capacity multiplied, and the mobilizing machine finally worked smoothly, so that in August the combatant strength reached 870,000, and when peace was declared the Russians actually had 1,132,000 men east of Baikal.

The total number of the Russian military population may be estimated as follows:

Present when war closed	1,132,000
Dead from disease	18,130
Dead in hospital and quarters from wounds	3,541
Killed in battle	19,467
Missing	39,729
Taken prisoners (estimated)	60,000
Returned to Russia (after deducting one third sent back)	80,283
Discharged for disability	24,255
	1,378,105

Add to this the strength of the Port Arthur garrison, and it will be seen that the total Russian military population in the Far East numbered approximately 1,400,000 men, giving a mortality from disease of 13.4, and from wounds, including part of missing, or 26.8 per thousand.

The scope of this paper does not permit of

any detailed account of the sanitary organization, *personnel*, or *matériel* of the Russian armies in this war — very important matters, which cut no inconsiderable figure in determining the excellent sanitary results — so I shall at once proceed to the consideration of the morbific and traumatic circumstances of the campaign.

SPECIAL DISEASES

It goes without saying that the time for a decisive discussion of the sanitary statistics of the war in Manchuria has not yet arrived. It took a number of years for the statistics of our Civil War to crystallize into their present form, and we must expect this to be the case with the statistics of the Russian and Japanese armies in the war of 1904–05. General Kuropatkin himself stated, six months after Mukden, that he did not then know whether he had 275,000 or 290,000 bayonets at that battle. I find by reference to my notes that on July 29/August 11, 1905, the following telegraphic report was sent to the Emperor:

	Officers	Men	Total
Sick	975	24,004	24,979
Wounded	52	1,313	1,365
Grand total			26,344

Of the cases within the theater of war on that date, there were under treatment for —

Typhoid fever	1,151
Typhus fever	22
Dysentery	418
Anthrax	2
Variola	21
Scurvy	233

From the beginning of the war up to July 1/14, 1905, there had been under treatment for —

	Cases	Deaths
Typhoid fever	10,449	1,041
Typhus fever	201	35
Relapsing fever	170	11
Dysentery	5,456	256
Variola	209	12
Scurvy	1,180	10
Measles	11	1

Report of morbidity on August 1/14, 1905, handed me by Dr. Gorbacevich, September 5, 1905, reads as follows:

	Wounded	Sick
Officers under treatment	38	945
Enlisted men	1,116	26,796

The infectious diseases on that day were:

Dysentery	677
Dysentery, pseudo (?)	181
Gastro-enteritis (epidemic)	299
Typhoid fever	2,709
Typhus fever	19
Grippe	1,013
Relapsing fever	9
Malarial fever (intermittent)	473
Anthrax	3
Erysipelas	71
Scurvy	281
Measles	3
Small-pox	21
Total	5,759

This report does not seem to agree with that sent to the Emperor:

MORBIDITY AMONG THE RUSSIANS IN THE FAR EAST

On August 31/September 13, 1905, there were —

	Officers	Men	Total
Sick	1,024	23,489	24,513
Wounded	30	592	622
Grand total			25,135

The diseases being:

Typhoid fever	5,287
Dysentery	646
Typhus fever	40
Grippe	1,089
Malarial fever	559
Anthrax	1
Erysipelas	41
Scurvy	104
Small-pox	4
Measles	4

From the foregoing it will be seen that the morbidity experience of the Russian armies in the Far East has been different in certain important particulars from that in recent wars. There was, to be sure, typhoid fever and

Fig. 1. Eating in camp.

dysentery in not inconsiderable amount, but malaria cut very little figure, while mumps and measles, which we always look for, practically failed to appear. There was a considerable amount of scurvy, probably much more than is of record, and venereal was of little moment. In fact, the comparatively small number of deaths from disease (18,830) indicates a state of healthfulness unequaled in military history. The question naturally arises as to why this was so, and this I will endeavor to explain.

The Russian peasant who reaches the age of maturity is the survival of the fittest; for the conditions of his life from the beginning are such as only the strongest can endure. Huddled together with the rest of his probably large family in ill-constructed and unventilated habitations, poorly fed and worse clad, the child grows up in an atmosphere of privation, is subjected to all the diseases of infancy, endures the rigors of a harsh climate, and survives only because of his own intrinsic resisting powers.

Owing to Russia's enormous population, the amount of material available for military purposes is practically unlimited, and from this material she took the best for service in the Far East. Starting in perfect physical trim, the men of the mobilized units traveled slowly for two months across the continent of Asia, under constant observation and frequent critical inspections, so that every man who by any chance might have been suffering from latent infection at the beginning, or who developed such infection *en route*, was at once separated from his command. Thus it was that the troops reached the theater of operations free from infection, and in good condition to resist the morbific influences they would necessarily be subjected to in active service.

Of the climate of Manchuria little need be said here. That part of the country I saw (Harbin region) reminded me of our own northern Mississippi Valley in many respects—soil, vegetation, temperature, streams, etc. The summer is comparatively short and there are many warm days, while the winter is correspondingly long and cold, the mercury lingering around zero, and often falling much below it in January and February. In July and August is the rainy season, during which there are at least daily showers, and often continuous downpours, the result of which is that the whole country goes into solution. The snowfall is light, and the snow does not remain on the ground for any length of time, being blown away by the wind or vaporized by the sun.

I was told that the prevalent diseases among the natives are typhoid fever, dysentery, and small-pox. In 1899 bubonic plague appeared in Newchwang, but was confined to that region. I heard of but one outbreak of plague within the Russian lines during my sojourn in Manchuria. This occurred at Dgai-lai-noir, a station on the railroad not far from the border, September 22, 1905, just before I started for home, and seems to have been accepted by the authorities as a veritable plague. The disease was apparently confined to one family, eleven of which died. As strict quarantine precautions were at once instituted, I presume there was no extension of the infection, though I left the country before this could be determined. In 1902 a quite severe epidemic of cholera began at Vladivostock and reached westward to Harbin, but no cases of the disease were reported while I was in the Far East.

It is important to add that there are but few mosquitoes, and those I saw belonged to the Culex group. During the rainy season the common house-fly swarmed in countless numbers, and I was forced to protect myself from their nightly attacks by using my mosquito-bar.

The conditions of the campaign in Manchuria until after the battle of Mukden (March, 1905) were such as to demand frequent changes

of camping-grounds, there being at least one battle monthly, so that before Mukden the army was not exposed to great danger from soil pollution. During the Russian occupation of Mukden, and subsequent thereto, until May, 1905, the troops were, for the most part, quartered in "dugouts."

The army ration was adequate and well balanced, but much of the time all its components were not obtainable. During the winter, I was told, vegetables were scarce, and the dietary was largely meat, bread, and tea.

The Russian food habits and method of cooking are ideal, from a military standpoint. Everything except the bread is boiled, and is thus not only thoroughly sterilized, but is placed in the best possible condition for assimilation. Moreover, the universal use of soup and tea reduces the demand for raw water to a minimum, and largely eliminates the probability of infection from this source. The Russians, though constantly driven back, were not demoralized. Attacked furiously and persistently by overwhelming numbers, this army was never captured, and was always quite as ready to fight, though not, until the last, so well prepared as was its adversary. So the moral effects of persistent defeat cut little or no figure in the mortality bills.

From the foregoing outline of sanitary conditions obtaining among the Russian forces, it would have been easily possible to predict what the sanitary results must be.

Typhoid and bacillary dysentery were endemics in Manchuria, and these diseases were bound to appear in the army with greater or less virulency, even though the troops arrived in perfect health and as a rule lived rationally. I say "bound," because these infections were widespread, and, under the conditions of military life, could not be wholly avoided. The question for us is, Was the best done that the conditions permitted?

In attempting to answer this I will briefly consider the ætiology, prognosis, and results of some of the diseases specified, especially of typhoid fever and dysentery.

I think that, in the light of present experience, we are justified in believing that certain factors of dissemination of typhoid infection cut a much larger figure in camp typhoid than in house typhoid. Based upon the report of the board appointed to investigate the typhoid epidemic in our camps of mobilization in 1898, there seems to be little doubt that flies and personal contact were the important factors in spreading the germs, while water was secondary or even negligible. This conclusion, which was certainly revolutionary, and which, I think, is largely justified by the evidence, is accepted by us more freely than it is abroad, where the fly and personal conviction are not so seriously regarded.

In discussing the causes of typhoid in the Russian camps, Dr. Gorbacevich, chief medical inspector, stated his views to me as follows:

1. The fouling of the surface of the ground by infected excrements.

2. Constant employment of men in the trenches. (Soiling with earth, and exhaustion.)

3. Impossibility of personal cleanliness in camp during the rainy season, which is the typhoid season among the natives.

4. Crowded state of the military population in camp, and the unaccustomed conditions of military life.

5. The infection of drinking-water by surface-washing, especially during the rainy season.

Dr. Gorbacevich further stated as his opinion that flies had nothing to do with the spread of typhoid fever in the armies of the Far East, though they were an important factor in spreading dysentery and anthrax.

He further said that typhoid fever is epidemic in Russia during cool weather, reaching its maximum in October and November, and thereafter diminishing until February, when it disappears. This is the rainy season in south-

Fig. 2. Sleeping-tent.

ern Russia, *but there are no flies.* In northern Russia the epidemic disappears with the coming of snow. All the Russian physicians with whom I conversed on this subject agreed with the views expressed by Dr. Gorbacevich.

Nothing is more certain than that typhoid fever is a water-borne disease, and I think that we are perfectly justified in believing that infected water is the chief cause of typhoid fever in house-dwellers, for they have no open sinks, and flies are excluded. But with tent-dwellers the conditions are different, for in military camps the population is dense, the sinks open, personal cleanliness and camp police often indifferent, infection almost always present, and, during the beginning of the typhoid season, flies always abundant. Here the man and the fly are the disseminators of typhoid fever.

Before considering several of the facts regarding typhoid fever as seen in Manchuria, I will briefly state what seems to be the accepted views of the medical profession on the role of the fly in disseminating the bacillus typhosis. The report, above referred to, of the board on typhoid fever in our camps of mobilization in 1898, of which disease the board states that there were over twenty thousand cases[1] and a mortality of seven per cent, indicates that water played an unimportant part, but that the infection was carried by flies, dust, and personal contact.

Veeder asserts his belief that flies are the chief factor in transmitting infection during the autumn, the period of most pronounced activity of the disease, a conclusion reached from an investigation to determine the origin of a local epidemic. Interesting experiments were instituted by Ficker to determine if flies could be infected by feeding on typhoid cultures, how the bacilli acted within the insects, if flies could transmit the infection to human beings, and if so, for how long a period. The conclusions reached were, that the common house-fly could eat the typhoid bacillus without danger to itself, and that it could transmit the infection for a period of twenty-three days. The bacilli were found in the head, wings, and legs on the fifth day and in the intestines on the ninth day after the ingestion of the infected material.

That personal contact cuts a considerable figure in the transmission of typhoid fever is shown by the investigation of Tolayvoch, who reports that between 1881 and 1899, 6.3 per cent of the cases of typhoid fever occurring in the German army were hospital infections.

It must not be inferred from the foregoing that I am inclined to disregard the importance of water as a cause of typhoid infection. This has long passed the period of surmise, and has become universally accepted. Certainly, in the light of experience, no military sanitarian can ignore the pernicious effects of the average raw water. Indeed, I have contended that the use of boiled water should be as much a part of military routine as the use of boiled potatoes, or any other cooked food. In campaign our only safety lies in regarding all water as infected. This involves the training of our soldiers to use boiled water at all times, and the constant employment of some sterilizing apparatus with a *personnel* to care properly for it. The extra work and cost involved would amply be repaid by the decreased non-effectiveness of water-borne diseases.

I believe the campaign in the Far East fully sustains the position heretofore taken by military sanitarians regarding camp typhoid, and it certainly shows how difficult it is to exclude this disease, no matter how favorable the conditions may be.

It has already been shown that the Russian soldier reached the theater of war free from infection, and that he campaigned in a country where typhoid fever is endemic. Let us now consider the movement of this disease during the war.

By reference to the table showing the movement of sickness from the beginning to July 1, 1905, it will be seen that 10,449 cases of typhoid fever had come on sick report, of which 1,041 died in Manchuria.

I learned that on July 18, 1904, there were 100 cases in hospital, of which 50 came from the front; October 26, 1904, 4,350 cases, of which 3,700 came from the front; and on December 31, 1904, 900 cases, of which 800 came from the front.

From January 1 to July 1, 1905, there was

[1] The German army had over 7,300 cases of typhoid fever during the year of the Franco-Prussian War.

a daily average of 175 cases of typhoid fever on sick report. There were on—

	Cases
July 15, 1905	800
July 23, 1905	1,500
August 1, 1905	2,400
August 15, 1905	3,500
August 23, 1905	4,400
September 1, 1905	5,287

Fig. 3. Hospital ward.

I am indebted to Dr. Gorbacevich for the following table:

TYPHOID FEVER

During August and September, 1905. (Including last week in July.)

Period Week	Army	[1]Rate per Thousand All Diseases	Actual Number of Cases of Typhoid
Fourth week in July, 1905.	First Army		234
	Second Army		394
	Third Army		166
	Rear Army		166
	Preamur District		19
			979
First week in August, 1905.	First Army	34.7	180
	Second Army	39	254
	Third Army	29.9	66
	Rear Army		123
	Preamur District		20
			643
Second week in August, 1905.	First Army	22.2	167
	Second Army	35.5	285
	Third Army	34	157
	Rear Army		354
	Preamur District		109
			1,072
Third week in August, 1905.	First Army	17.4	199
	Second Army	26.5	193
	Third Army	27.9	86
	Rear Army		227
	Preamur District		51
			756
Fourth week in August, 1905.	First Army	19.2	256
	Second Army	31.7	148
	Third Army	20 8	132
	Rear Army		103
	Preamur District		54
			693
First week in September, 1905.	First Army		193
	Second Army		132
	Third Army		73
	Rear Army		70
	Preamur District		36
			504
Second week in September, 1905.	First Army		82
	Second Army		97
	Third Army		64
	Rear Army		55
	Preamur District		40
			388

[1]The rate is based on the strength of the respective armies. The three field armies had a combined strength of 729,000. Of the cases under treatment, 9.1 per thousand were in hospital.

On September 16, 1905, the total number of cases of typhoid fever under treatment was 5,898.

Information from another source was as follows:

Typhoid fever in July, 1905:

	Officers	Men
Taken sick	136	2,662
Died	3	359

Typhoid fever in August, 1905:

Taken sick	149	3,884
Died	6	672

From the beginning of the war to September 1, 1905, there were 17,035 cases of typhoid fever, of which 2,077 died.

It will be observed that there are considerable discrepancies between the statements of the different authorities as to statistics. Such must be expected and averaged. Statistics take a long time to crystallize, and during the process are constantly changing, though always pointing in the direction of the final permanent form.

There was a steady decrease in the number of cases from the middle of August, which, it is reasonable to assume, continued until the

normal endemicity was reached. This decrease was undoubtedly due to the stricter enforcement of sanitary orders, the observance of which had been considerably relaxed. The best evidence of the good results following such enforcement is obtained from our own experience in the Spanish-American War, in which typhoid was reduced from five per cent in September to a fraction of one per cent in December, 1898.

It might be well here to consider some of the individual and collective habits of the Russian soldier-man as causative factors in the dissemination of typhoid infection.

I have heretofore stated that the preparation of the ration was ideal from a sanitary standpoint, the food reaching the soldier hot, diluted, and with every bit of its nourishment in the best condition for easy assimilation.

Fig. 4. Officers' tent.

His favorite beverage, tea, demands the ingestion of a large amount of hot, sterile, and stimulating liquid. His bread is a more likely source of infection, but being made from a flour containing all the elements of the grain, it promotes peristaltic action, and keeps the digestion regular. I look with suspicion on the bread as an inviter of flies, and of hand and mouth infection. This possibility seems to have impressed itself upon the Russian physicians, for I observed in the venereal ward of the naval hospital at Vladivostock that every patient was required to keep his ration of bread in an individual bag hung at the head of his bunk, and was not permitted to expose it, except at meal-time. Here is a note I made August 25, 1905, at the Etape eating-station, Gungalin:

"Contiguous to the bakery are a number of kitchens, and in the open air many tables, at which the men were standing eating their rations in apparent content. I watched the process with interest. On the table in front of a squad was a dish of soup and one of cassia (buckwheat), and scattered around at convenient points, hunks of black bread. Each man was provided with a wooden spoon (individual) about the size of a large tablespoon, which he dipped indiscriminately into the soup, the cassia, and his mouth; chunks of meat carved with a jack-knife were eaten from the hand. I did not observe many flies about the tables this A. M., but on the other occasions have seen them swarming on the food, the tables, the men, and everything in the neighborhood, including the sinks. The possibilities in the spread of typhoid under such conditions are great, especially when the sink habits of the men are considered."

I think that this war has demonstrated, what is now accepted by us, "that flies are, under active service conditions, one of the most important disseminators of the typhoid germ, and that soiled hands cut no small figure."

It will be recalled that the troops had been in the same camps from shortly after Mukden. Until May they had burrowed in the ground, and thereafter had gone under canvas. The camps soon assumed a state of permanency, and were generally well kept, to outward appearance.

The Russian soldier's tent is square, with nearly a flat or gently sloping roof.

Its dimensions are: Height to peak, 7 feet 8 inches, to eaves, 5 feet 2 inches. The walls actually measure 6 feet, but with the slope the tent is but about 5 feet high at the eaves. Its area is 12 by 12 feet, and its maximum occupancy twenty men. The tent is pitched on a center-pole, and inside at each corner is a corner-pole. Robes sewed into the canvas of the roof run from the center to the corners. The length of the center-pole, which is jointed, is 7 feet 8 inches, and of the corner-poles, 5 feet 2 inches. There is a long guy-rope at each corner, which is secured to a large tent-pin 3 feet long and 3 inches in diameter. The walls and the roof are separate, the former being suspended from the latter, the space

between them serving for ventilation. This is covered by a flap sewed to the roof. The door is at the point where the ends of the wall meet. The shelter-tent was in evidence. In fact, it was almost universal at the front. This tent is much like our own, but, instead of being pitched for two, I observed that a squad of six usually combined their shelter halves.

The most comfortable arrangement I saw was a camp in which the tents were pitched on a turf wall 2½ feet high. Within, on either side, was a platform of boards, separated by a narrow passageway. The platforms and aisle were covered with Chinese matting, and the tents presented a very neat appearance.

This plan of fixed walls was quite generally followed, even when shelter-tents were used, and there was always an attempt made to get the men off the ground level, even if nothing but an earthen platform was available. I observed many tents with wicker-work walls, which certainly promoted ventilation.

Some of the tents were so badly worn that, *per se*, they no longer afforded shelter, and all sorts of material, chiefly mud, were used to patch them up, but, as a rule, they were in good condition.

Of course, everything that tended to fix permanently the tent prevented its frequent removal to another site, and the aëration of the occupied ground, so necessary to the healthfulness of the tent-dwellers.

I am informed that before the large increase in the number of typhoid cases, very little attention was paid to the regulation which required the construction and use of camp latrines, the soldier preferring a neighboring copse or swale to the uninviting latrine, and I remember to have seen very few vessels for night urination. I find in a note made at Gungalin, July 28, 1905, the following: "So far as I have observed in going about here, there is very little conservancy of pits and sinks." Later, there was a thorough house-cleaning, but this did not occur until after the typhoid epidemic had become established. The police of the camp-grounds was usually excellent, when such was at all practicable. But with the mud a foot deep, police of place or person was impossible, and the soil and the men soon

Fig. 5. Camp tent.

became mutually toxic. The sink habits of the men regarding personal cleansing, I believe, cut some figure in disseminating typhoid germs. Paper was scarce in Manchuria. At best, newspapers are not very plentiful among the Russians, and the men had nothing to cleanse themselves with except leaves or grass, and not always these, so the cleansing was done, if done at all, with the fingers, which, in turn, were wiped off on the most convenient thing, as there was nothing else to do.

Deep wells (60 to 80 feet) were dug for the use of the troops.

The standing regulations governing the use of water were quite drastic. They read as follows:

"The drinking of raw water is prohibited, except of spring or well water free from the possibility of infection, which will be determined by physicians, after consideration of the sources of the spring and the construction of the well."

"Muddy water containing suspended matter not traceable to its source must be clarified," etc.

"Water suspected of being pathogenically infected must not only be clarified, but purified by the indicated means."

"The responsibility for the adoption of the means devolves upon the surgeons of the units and hospitals."

The rules given are well known, generally accepted, and need not be repeated here, though there might well be a constant reiteration of the following regulation: "The best method of sterilizing water is by *boiling* it, and the most practical way to enforce its use is to give

it with the tea, which should be done whenever possible. All water used by the men for drinking should be boiled, for which purpose apparatus should be supplied. Water may be considered safe if boiled for thirty minutes, not counting the time consumed in bringing it to the boiling-point. Boiled water should not be kept for more than twenty-four hours, and must be kept as prescribed in paragraph 172, Interior Economy, in clean receptacles, which must be frequently washed, must be supplied with metal faucets, and tightly covered. The taste of boiled water may be improved by adding citric acid."

The wells I saw were supplied with windlass and bucket, and many of them were under guard.

The Russian peasant is accustomed to a simple life, and the life of the Russian soldier, itself simple enough, is a promotion to him. I had it from the Emperor's own lips that his soldiers in Manchuria were better fed than his peasants at home.

The soldier's material wants were well met, and he had little or nothing with which to obtain other than that which his government gave him.

In the Far East, everything was under absolute military control; nothing could be brought into the country except by military authority, and consequently little got there in the way of food or drink that could harm the soldier, even had he had the wherewithal to purchase it. I observed some stores where many necessaries and a few luxuries could be purchased at little more than home prices. These were branches of army co-operative stores in St. Petersburg and Moscow. Cigars and wine in moderation were obtained by officers; but the enlisted man's choice was very limited — tobacco, some sweet crackers, needles, thread, etc. I mention this to show that the Russian soldier was not subjected to the evil influences of the pie and beer vender, not to speak of viler stuff, and his intestinal tract was not thereby rendered inviting to the microbes, which are always seeking to destroy him.

I cannot but feel that the Russian authorities placed too much stress on one of a number of causes of typhoid epidemics, and lost sight of others of equal, indeed greater, importance, in camp typhoid. I am told that the Japanese isolated their cases of typhoid as strictly as those of small-pox; and who can question their wisdom in so doing? I know not what their typhoid statistics may be, but I am very sure that if isolation was strictly practised, the figures will be comparatively insignificant.

I do not think the necessity for isolation was fully appreciated by the Russians. They certainly sent the typhoid cases out of their camps in large numbers, but I was unable to learn of any extraordinary effort having been made to search out and isolate suspected cases, which is an important part of prophylaxis. Let us not forget, however, that the Russians were, at the time this epidemic appeared, thinking more of the enemy in front of them than that in their midst.

The conditions obtaining in at least some of the hospitals I inspected strongly impressed me with the opinion that the dangerously infectious character of the disease in its epidemic form was not appreciated by the hospital authorities. I have only a note here and there of the cases of hospital infection, but they occur frequently enough to indicate that such was rife.

The chief of the Red Cross at —— told me that the type of the disease was severer in 1905 than in 1904; that a Red Cross physician and nurse had died during the preceding week, and that several others were critically ill.

I find the following note (August 25, 1905) illustrative of the hospital conditions:

"This afternoon I visited the —— Red Cross hospital No. 2, where there are 120 typhoid cases under treatment, with two or three deaths daily. The typhoid

Fig. 6

and other cases are treated in the same wards, practically, as broad doorways connect all the wards and the doors are constantly open. The windows are without screens, the beds without bars, and the flies go as they list. The dejecta are received into bed-pans that contain no disinfectant, are covered with a solution of calcium chloride, and at once thrown into a privy vault, which is the receptacle of all the kitchen and other wastes from the hospital, and which vault is emptied by Chinese labor once weekly. I had a long talk with the head nurse, and told her about the dangers of the disease she was treating, regarding which she seemed ignorant, though anxious to learn. The well from which was drawn the water used in the hospital is about fifty feet from the latrine above described. In this hospital several of the *personnel* came down with typhoid fever. Apparently no precautions are taken to disinfect linen, dishes, hands, etc."

I later visited Military Hospital No. ——, contiguous to the above-mentioned Red Cross

Fig. 7. The Russian camp latrine, or sink, is quite different from those used in other armies, and opens wide its hospitable arms during the typhoid season to the swarms of visiting flies. Some of the different types I saw are shown in the accompanying photographs.

hospital. Here one of the physicians told me that the dejecta are received into a dry bed-pan, are disinfected in the pan, and thereafter placed in a large receptacle filled with disinfectant, and there remain for twelve hours. He further told me that all of the *personnel* are required to disinfect the hands after handling patients or infected material, which material also was disinfected. In proof of his statement, he showed me his finger nails, which were discolored, presumably by the disinfectant. I did not personally see the above-described routine. In the physician's opinion, the hospital was well infected (though this had not been demonstrated bacteriologically), as the latrines were on higher ground, and seepage therefrom into the well probable. He added that he had no doubt the whole place was thoroughly infected, as last year (1904) the buildings were occupied by Military Hospital No. ——, which was used as a typhoid hospital. Ten of the *personnel* had been taken with the disease—five in one week. I observed that the windows were screened, but the doors were hospitably open to the flies, and the patients were not protected by bed-nets. It was stated that attempts had been made to protect the patients through the use of veils made from gauze, but they threw them off. Upon the whole, I am impressed with the conviction that any effort made in the hospitals to prevent the spread of typhoid infection was, to say the least, inadequate.

A study of the health conditions as Vladivostock are interesting. This fortress, located at the seaport of the same name, is considerably south and east of Harbin, though in eastern Siberia. The report is of some importance, and there is a civil population of about twenty thousand at present. The strength of the garrison was, in 1904, 19,379; in 1905, 66,000, with outlying forces numbering about 35,000 additional.

The movement of sickness was as follows:

	1904		1905 (to Sept.)	
	Cases	Deaths	Cases	Deaths
Typhoid fever	132	22	68	4
Scurvy	3	.....	425	.....
Dysentery	7	.....	36	3
Grippe	223	.....	422	.....
Syphilis	128	.....	215	.....
Other venereal diseases	342	.....	(?)	.....
Enteritis	204	.....	663	.....
Diseases of lungs and throat, acute	417	21	560	6
Accidents and injuries	165	2	321	2
Diseases of the eye	61	.....	327	.....
Diseases of the skin	533	.....	(?)	.....
Other diseases	1,754	19	4,070	28
Total	3,970	64	7,107	43

Average strength of commands (not including sailors):

	1904	1905 (to Sept.)
Officers	378	(?)
Men	19,000	66,000

The water at Vladivostock is bad. There are no water-works, nor is there a sewer system.

During 1904 the following cases were treated in the —— Hospital, Vladivostock:

Typhoid fever	3
Malarial fever	14
Small-pox	1
Venereal	497
Pneumonia	19
Insanity	4
Tuberculosis	23
Wounds	151

Among these were 80 deaths. I was not given the statistics for 1905. In passing through the hospital I saw a number of cases of typhoid fever scattered throughout the various medical wards, mixed in with other cases. The surgeon told me that they were convalescents. The cases certainly must have been mild, as the cards indicated not over three weeks in hospital. I was informed that all cases are confirmed by bacteriological tests. The administration of this hospital was otherwise excellent, and yet here were typhoid cases treated alongside of other diseases, as though contagion was the last thing to be avoided.

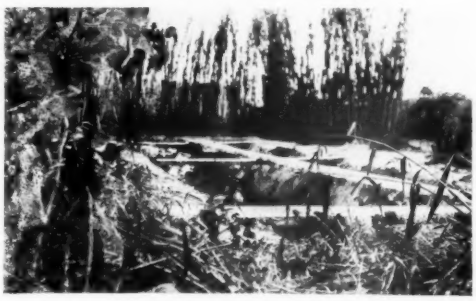

Fig. 8. Camp latrine.

As a practical fact, I don't think that the Russians have yet come to realize that camp typhoid fever is a quarantinable disease.

In glancing back over the foregoing somewhat disconnected story, one is impressed with the fact that the troops in camp on the lines were sufferers from typhoid. It cannot be said that there was overcrowding. The positions covered a front of more than fifty miles, and while they were occupied by over seven hundred thousand men, the camps were not continuous, but the troops were camped by regiment, or even battalion. I did not, of course, see all the camps, or even the larger part of them, but those I did see were certainly not overcrowded; there was, as a rule, ample space within the unit camps, and ample surrounding space for organizations.

The men went into camp in May, after a winter in dugouts, following a series of terrific battles, and with none too much food; indeed, it has already been stated that the scorbutic taint prevailed extensively. The question naturally arises as to whether these were the men attacked by typhoid; or were the late-comers the victims? So far as I could learn by inquiry of those with whom I could speak, the men longest on the ground were those first attacked; but not when they came out of winter quarters, and presumably were most debilitated; not during the cold of the spring, but during August, three months later. As Dr. Gorbacevich said, during this time they were working in the trenches, but typhoid remained at its minimum until July, when it began to increase. There were two universal conditions in July which had not before obtained during the year — rain and flies. According to Dr. ——, the camp conservancy had not been good, and the surface of the ground surrounding the camps — including the camp wells — was probably infected. We know that dejecta were scattered about on the surface, and we also know that there was some typhoid and some bacillary dysentery among the men. There was, however, no marked increase in the average number of dysentery cases. Regarding the use of raw water, the regulations seem to be specific enough, but, I fancy, were difficult to enforce.

The water, some of it, was analyzed, for every medical chief of a corps had a hygienist and laboratory attached to his staff, and besides these, there were three laboratories at Harbin and one at Gungalin, not counting the Botkin railroad laboratories. The director of the latter told me that he had made thirty water analyses from samples taken about Harbin, as the result of which five wells were condemned and filled up, colon bacilli having been demonstrated. I got no such definite

statement from other laboratories. Dr. Shaffer of the German army said, so far as he had observed, the soldiers drank when thirsty the water most convenient to get. Moreover, during the warmer weather they drank more than usual. It is a fair presumption that in Manchuria all running water is typhoid-infected, as typhoid is endemic there. So much for this possible cause of the typhoid epidemic. It has been heretofore stated that the common house-fly made its appearance in July, in swarms, and continued until frost came. The sinks were convenient; the fly, ubiquitous. How considerable a factor was the fly in this typhoid epidemic? Then, too, during the rainy season, the men lived in the mud; they could neither keep themselves, their habitations, nor their camp-grounds clean. Were they factors in spreading the epidemic? If the typhoid bacillus was spread by these means, then why not the Shiga bacillus?

I quote from my notes of September 13, 1905, made while *en route* to Vladivostock: "Speaking of the typhoid epidemic which is likely to spoil the splendid health record of the Russian army, I am impressed with the belief that the following factors enter into it:

"1. The endemicity of the disease in Manchuria and in the army, many cases occurring every month.

"2. The depreciation of the health of the army during the winter in sod houses, the result of which was a marked scorbutic taint.

"3. The long continuance in the same camps.

"4. The rainy season, which began July 10th and continued through August.

"5. The appearance of flies, which occurred in June."

All of the conditions, except the second, are identical with those which appeared in our camps during the Spanish-American War. The advantages with the Russians was that they could get no food other than that issued to them, and no stimulant other than tea.

The epidemic of typhoid in 1905 attacked probably one per cent of the fighting army, say seven thousand, for most of the cases came from the front. Of this, probably twelve per cent died, as the infection was more severe in 1905 than in 1904—say 840 men. This is about the same number of cases as were reported in Philadelphia in 1904. Can a field army do better? I think so; but there will have to be a wider dissemination of a knowledge of the laws of right living before the white man will do it.

I learned nothing new regarding the treatment of typhoid. The same routine of sponging, diet, and watchful care. There were few facilities for tubbing. Soup, always acceptable to the Russian, was the diet, no milk being available; and those who desired it were permitted to eat bread. I heard of no operations for perforation, though frequently asked if such had been done. When I left Manchuria the time had not yet arrived for compiling the detailed statistics of the epidemic, and what is noted here is from the point of view of a hygienist rather than of a clinician.

DYSENTERY

Dysentery has always been recognized as one of the most important causes of non-effectiveness in field armies. It was a veritable scourge to the Russian forces in China during the Boxer uprising. Dr. Gorbacevich told me that the mortality from this disease in that campaign was sixteen per cent of the cases, whereas during the present war it is less than five per cent. The Union army lost from dysentery during the Civil War 24.77 per thousand—nearly twice the number dead from typhoid fever. Kean, quoting from the medical and surgical history of the war, says: "These disorders [dysentery and diarrhœa] occurred with more frequency and produced more sickness and mortality than any other disease. They made their appearance at the very beginning of the war, not infrequently prevailing in new regiments before their organization was complete, and although, as a rule, comparatively mild at first, were not long in acquiring a formidable character. Soon no army could move without leaving behind it a host of the victims. They crowded the ambulance trains, the railroad cars, the steamboats. In the general hospitals they were often more numerous than the sick from all other diseases, and rivaled the wounded in multitude."

Even as comparatively recently as the publication of this remarkable work, 1879, there was but a glimmering of the true causes of this scourge of armies. Lieutenant-Colonel J. J. Woodward, medical department, United States army, its distinguished author, in summing up his classical consideration of the causation of dysentery, says: "For myself, I strongly incline to adopt the view of the contagion of the stools for a certain class of dysenteric cases, yet I frankly admit the recorded evidence on this head is by no means so conclusive as that which we possess with regard to typhoid fever."

We now know that dysentery in its various forms is produced by definite organisms and is infectious. The history of the numberless epidemics in armies, reports of which have been made as far back even as the time of Herodotus, all point to this essential fact, and yet it was not until 1888 that Chantemesse and Widal first described the bacillus of dysentery, and not until 1898 that Shiga, a Japanese scientist, proved conclusively that the bacillus which bears his name is the true cause of epidemic dysentery.

There is, to be sure, a so-called tropical dysentery, due to amœba, but of this no case was found among the Russians in Manchuria, and it need not be considered here.

As the *contagium* of dysentery is contained in the dejecta of the sick, and, like that of typhoid fever and cholera, must be eaten or drank—in other words, taken into the intestinal tract—to produce the disease, the conditions under which dysentery becomes epidemic in armies are practically identical with those of typhoid fever; moreover, epidemics of dysentery usually occur during the late summer and autumn, coincidentally with those of the typhoid and fly seasons.

As to causation, some authors entertain the opinion that water is a less important factor in the spread of the Shiga (dysentery) than of the Eberth (typhoid) bacillus. This view was undoubtedly entertained by the Russian army physicians, who, it will be recalled, attributed the typhoid in their armies to water-infection, and the dysentery to fly-infection.

As a practical fact, however, the obtainable statistics show but 5,456 cases of dysentery for the period of the war ending July 1, 1905, of which 256 died. On August 1st, one report shows 418 cases and another 677, with 181 cases of pseudo-dysentery. At no time did the number of cases reach beyond about half the number of typhoid cases, and the mortality was less than half the rate for typhoid fever.

It is interesting to speculate as to why the two diseases did not increase proportionately, since the conditions were so favorable to propagation, with this possible difference, that dysentery is not a water-borne disease, or, at least, water plays a minor role in its distribution.

I find by reference to my notes regarding Military Hospital No. ——, Harbin, assigned as the contagious disease hospital, the following, under date of August 3, 1905: "There are to-day under treatment 35 cases of typhoid, 135 dysentery epidemica, 2 varioloid, 1 diphtheria, and 23 erysipelas. A considerable number of cases of typhoid have been treated in this hospital during the last sixteen months, with a mortality of from five to six per cent.

"For the last four months a dysentery (Shiga) serum, manufactured at the government laboratory, St. Petersburg, is being used with most satisfactory results, so the surgeon states. It was used in two hundred cases received since May last, among which but three deaths occurred, the average mortality, the surgeon said, being four per cent. The dose is from ten to one hundred grams hypodermically. Four injections may be given daily, the total amount not to exceed one hundred grams. The serum should be kept in a cool, dry place, and is efficient for a year. I obtained a sample of it.

"There is an excellent laboratory at this hospital, under charge of a professor from the University of Tomsk, which seems to be a working institution. I was told that all cases of typhoid were proved by the Widal test. No amœba have been found in the stools of any of the dysentery cases."

Except for the serum, the usual routine of treatment was observed in the dysentery cases. Regarding the serum treatment, I have not sufficient *data* to base a conclusion, but it certainly seems most promising, and will bear

further investigation, nay, demands it, so far as we are concerned, for, thus far, our experience with dysentery has not been happy.

From Kean's table I learn that during the four years of the Civil War we had an annual average of 735.96 cases per thousand of diarrhœa and dysentery, with a death-rate of 22.91, and Colonel Woodward writes in the medical and surgical history of that war that "these disorders occurred with more frequency and produced more sickness and mortality than any other form of disease."

In the list of diseases given at the beginning of this chapter it will be observed that epidemic influenza looms up somewhat prominently. I have no doubt of the existence of this disease in Manchuria, for I had an opportunity to observe several cases of it on the attaché's train. I am quite sure that the diagnosis was often a tentative one, for I was told in the hospitals that not infrequently cases admitted with this diagnosis subsequently developed well-marked typhoid symptoms. Both typhus and relapsing fever cases were constantly present with the army, though in small numbers. Of the former there were 201 cases up to July 1, 1905, with a mortality of 35, and of the latter, 170 cases, of which 11 died. I saw some of these cases in the quarantine hospitals.

Small-pox cut very little figure in the mortality tables,— 209 cases, of which 12 died. All men who join the Russian army are vaccinated, and this is repeated before starting on a campaign, and thereafter whenever necessary, so there was no reason to expect a severe manifestation of the disease, even though it is endemic among the natives of Manchuria.

The 1,180 cases of scurvy with 10 deaths probably represents but a small proportion of those more or less affected by the scorbutic taint. I learned from many sources that scurvy modified the course of both medical and surgical cases, and I have actually seen cases of typhoid fever with well-marked scorbutic symptoms.

Anthrax was always present in the army. This was accounted for by the Russian physicians on the hypothesis that the infection came from the sheepskin lining of the overcoats. Anthrax was epizoötic in Siberia, and might easily have reached the army through sheep which were brought from there by the thousand. These cases were treated antiseptically, but all surgical procedure was avoided.

The remarkable absence of mumps and measles will be noted.

I have no record of the total number of cases of pulmonary and cardiac diseases.

The statistics of venereal diseases from the beginning of the war to September 1, 1905, are as follows:

	1904	1905
Syphilis	2,867	1,600
Gonorrhœa and chancroid	5,756	3,276

The statistical officer estimated that gonorrhœa was to chancroid as 2 is to 1.

The total number of insane was 1,081, of which 244 were officers.

I heard of no cases of beriberi among the Russians.

The foregoing *résumé* of the morbific conditions and results among the Russians in the Far East, so far as at present known, should afford a lively satisfaction to those interested in the welfare of the soldier, both from a humanitarian and a militant standpoint. Russia, to be sure, had the advantage of the example of our sanitary errors, followed by those of the British in South Africa, and there was no reason why her soldiers and physicians should not have been fully alive to the importance of military sanitation. Then, too, the people of Russia were stimulated by the widely heralded sanitary work of their adversaries, and spared no effort to produce equally good results in their own armies.

Truly, the war in the Far East has taught us many valuable lessons, but none is more valuable than the sanitary lesson of that conflict.

So extended a discussion here of the morbific circumstances of the campaign in the Far East is only justified by the lessons we may derive from them, and which we, you and I, as military surgeons, may any day be called upon to apply in behalf of our own soldiers.

The traumatic circumstances, the purely surgical conditions, of the campaign would naturally be of great personal interest to the members of this society, and at the risk of further trespassing upon your time and patience

I will invite your attention to a few salient features.

The extraordinarily large number of wounded and great mortality from artillery fire cannot fail to attract attention to the development of this arm. Over twenty per cent of the killed and wounded are chargeable to artillery; more than twice that recorded by the Germans in the war of 1870.

The somewhat sensational reports sent from Manchuria regarding the terrific hand-to-hand fighting would lead to the inference that wounds from "cold steel" must cut no small figure in the casualty tables. As a matter of fact, such wounds are practically negligible, less than a total of two thousand being reported by the Russians.

So far as it is possible to compare the losses of the two contestants from *data* now available, which are yet incomplete, and consequently unreliable, it appears that, proportionately to the total casualties, the Japanese wounded exceeded the Russian by twelve per cent, while, on the other hand, the Japanese killed were fourteen per cent less than the Russian.

The fact, if it be a fact, that thirty-three per cent more Japanese wounded died in hospital than did wounded Russians might indicate that the most severely injured among the latter, through the exigencies of war, were, perforce, left to die on the field of battle, while the Japanese were able to get practically all of their wounded to hospitals. The latter reported only about eight thousand "missing," while, as previously stated, the Russians had nearly forty thousand.

I am yet uncertain whether or not there are new lessons for us to learn from this war, regarding the stopping effects of the small-caliber high-powered projectile.

Is it possible that the 7.60 mm. cupronickel-jacketed bullet of the Russians, which weighs 13.7 grams and has an initial velocity of 640 m. ($mv.^2=561$), is more humane than the 6.50 mm. German silver-jacketed bullet of the Japanese, weighing 10.5 grams, with an initial velocity of 725 m. ($mv.^2=552$)? This can apparently be answered in the affirmative, if to kill is considered more humane than to wound, but cannot now be answered conclusively.

A chief operating surgeon, writing from Liao-Yang, May 31, 1904, where "most of the wounded passed through my [his] hands," says: "The experience here convinced me that the Japanese rifles are better than ours. The range of this weapon is very great. Within 200 m., though the track of the bullet is small, the wounds were very fatal, owing to the explosive effects, there being extensive shattering of bone, or, in the abdomen, tearing of intestines. At longer ranges, 400 m.–800 m., the wounds were less serious. Except in abdominal lesions, the wounds inflicted by the Japanese rifle healed quickly. Even in abdominal cases with severe lacerations of the intestines, several patients recovered after suture of the intestines, where asepsis could be maintained. Wounds of the lungs were usually of a less serious nature, particularly those received at the higher ranges. Beyond 1,000 m. the bullet disintegrated, and the wounds of entrance and exit were usually considerably larger than the channel made by the missile in its course through the tissues, and bones were seldom shattered." The same official is my authority for the statement that at the shortest ranges infection of the wound was infrequent, but at the higher ranges this was more often observed, due, he says, "to the foreign matter, especially clothing, driven into the wound." In concluding his report, he writes: "We can say that the Japanese bullet is modern and humane. About thirty-two per cent of the wounded were returned to the fighting line inside of one month." Later, this authority wrote, on the subject of "humane" bullets, in a less optimistic frame of mind, as follows: "Fight only during the warm season, before frost; let the battle be on soft ground, free from stones or rocks, at ranges not less than 250 m. See to it that the men go into the fight with empty bowels and bladder, and that there be no shooting at heads. If these conditions can be enforced, then the bullet so deadly to-day might prove humane." Dr. Wreden thinks that the modern jacketed bullet is, under certain conditions, more destructive than the old (large caliber) bullet, and that the lessened mortality among the wounded is wholly due to improved surgical technique. He says: "From the beginning of the war to

January 1, 1905, only one amputation was required in every two hundred cases."

The statistics above quoted would indicate that the Japanese bullet is humane, as it was the chief factor in killing outright twenty-nine per cent of all Russians hit, and wounding fifty per cent, of whom but four per cent died. To be killed outright is certainly more humane than to suffer long from painful and disabling wounds.

The shrapnel bullet is more than twice the caliber of the rifle-bullet and with but one sixth its velocity; it is not jacketed, and when the projectile bursts, the shrapnel frequently deforms, assuming all sorts of shapes. While the shrapnel has no hydrodynamic effect, it inflicts severe wounds, with great destruction of both hard and soft tissues.

Of shrapnel, Colonel Havard writes: "These shells were much more numerous and did most of the execution." Of the Shimose shell he says: "It explodes with great noise on striking the ground, excavating a little crater, and giving off a small cloud of thick brown smoke. Except when exploding within a short distance, it does but little mischief, for it breaks into a multitude of fragments, most of them minute and without much power of penetration."

Has the time yet arrived for us to draw anything more than very general conclusions from the surgical statistics of this war? I think not. I find, in looking over my notes, numerous entries which give some indications of the direction in which the experience will probably work out.

August 16, 1905. Dr. Brentano of the German Red Cross hospital said that altogether 600 cases of all kinds had been treated in his hospital. These included 127 surgical operations, of which 4 were amputations; 1 shoulder, tetanus, died; 1 thigh, lower third, shrapnel wound, infected, recovered; 1 arm, middle third, tetanus, died; 1 leg (Gritti operation), shrapnel wound, recovered. There were 3 resections, 2 of hip and 1 of wrist, all of which recovered. About 10 per cent of the surgical cases died as follows: 4 tetanus, 4 sepsis, 1 peritonitis, 2 meningitis, 1 empyæma, and 1 rupture of spleen. Only one cœliotomy was done, for gun-shot wound of abdomen with peritonitis; this resulted fatally. Four pelvic abscesses following gun-shot wound of abdomen were evacuated per rectum, and recovered. No cases of bayonet or saber wounds were received. Dr. Brentano further said that almost all cases of shell and shrapnel wounds arrived infected. In one case (non-infected) a shrapnel bullet penetrated the right lung, and was removed from the back. Cases of gun-shot wounds from rifle-bullets were usually sterile.

Dr. Butts, in charge of a Red Cross hospital at Gotsiadan, furnished the following statistics: From ten to twenty per cent of all missiles lodged. Three to four per cent of bullets lodged. All shrapnel wounds were infected, and but few bullet wounds. Of fifty cases of infected wounds of head operated upon, one half died; of one hundred and fifty sterile cases, ten per cent died. Dr. Butts is also of the opinion that rest and surgical non-interference are the indications in wounds of the abdomen; fifty per cent of such cases died of peritonitis. He reports five cases of abdominal abscess following wounds, all of which recovered. Among 915 operations there were 75 amputations, 15 resections, 25 excisions, 3 aneurysms, 200 trepanations.

Dr. Butts treated 24 cases of gangrene, of which 23 died, and 3 cases of tetanus, all of which died.

Regarding the anatomical location of wounds, I have no *data* of sufficient extent to be of general value. I have heard it stated casually that the number of wounds of the head and right upper extremity was unusually large, due to the necessary exposure of these parts in the act of firing, but I have not regarded this as an authenticated statement.

From what I have been able to gather from conversation with Russian surgeons, I think it probable that we shall have no occasion to modify our views regarding the effects of high-powered bullets at different ranges. Dr. Wreden writes: "The explosive effects of the Japanese bullet in spongy bone tissue is observed only at close range—100 m.—beyond which the destruction is slight, but in dense osseous tissue, explosive effects are observed up to 800 m. Within 200 m., wounds of the cranium are

generally fatal, the hydrodynamic effects being most marked, and within 100 m. the calvarium is greatly comminuted. Beyond 200 m., tangental wounds of the head are not usually fatal, but penetrating wounds are lethal up to a 100 m." Dr. Wreden regards wounds of the face and neck serious, and if the latter are complicated by injuries to arteries, trachea, or œsophagus, they are usually fatal. Colonel Havard reports a wound of the cervical region, in the case of Prince Murat, in which the bullet transversed the neck from side to side, coming out close to the internal carotid artery, and another case, in which the missile entered at the point of the chin and emerged close to the spine on the right side. Both of these cases were convalescing.

So far as I could ascertain, there is a general consensus of opinion that bullet wounds of the lungs were not serious.

The impression left on my mind is that cœliotomy for any purpose was a rare operation. This impression was gained, not from statistics—for such were not obtainable, except from a single hospital here and there—but from conversation with many surgeons. The only really definite statement I have on the subject is found in a report made by a chief operating surgeon, of which I will submit a free translation. "Among the most serious wounds we have encountered are those of the abdomen, in the treatment of which very little has been accomplished. We can only say that the more rest the patient can have from the very moment of the infliction of the wound, the better the result. The character of the missile — bullet, shrapnel, shell — or cold steel is of great importance in determining the result, and lesions caused by each of these should be considered separately. The severity of wounds of the abdominal region caused by the modern bullet is directly proportionate to the range. As the result of the experience gained in several operations done for penetrating gun-shot wounds of the abdomen at close ranges, I was deeply impressed with the great explosive effect of the modern bullet. In some of the cases in which the stomach was full, it was burst into pieces and entirely separated from the surrounding organs. A like result followed with a full bladder, and great havoc was wrought in liver, spleen, and kidneys. In such cases, as was to be expected, the symptoms of shock were pronounced, and resembled those of internal hemorrhage. The wounded man almost invariably fell to the ground, complaining of intense pain in the belly, but did not lose consciousness. If left quiet, the pain subsides and the shock disappears." The report adds: "These cases never spoil the statistics of the rear hospitals, for they die on the field or at the dressing-station."

"Beyond 400 m. the explosive effects were not observed, and the patient did not at once fall. Soon, however, symptoms of shock supervened, with vomiting, especially in alcoholics, and the wounded man lay down. This condition usually continued for several days, and has led to early operative interference, which only resulted unfortunately."

The reporter estimated the mortality from rifle-bullet wounds of the abdomen at forty per cent of such cases. This was based upon nine months' experience in the Far East. Shrapnel wounds penetrating the abdomen were much more serious than bullet wounds, the mortality being about eighty per cent; when they involved the liver, spleen, or kidneys, they caused death quickly from extensive hemorrhage, and in the stomach, intestines, or bladder the shrapnel inflicted much severer wounds than the rifle-bullet, even within the explosive ranges.

Wounds of the abdomen from ricochet bullets or shell splinters were usually so extensive that surgical interference, even under the best conditions, would probably have been ineffective. Such wounds were particularly observed among artillery-men. The external appearance of these wounds differed from those made by the ordinary bullet, the wound of entrance being considerably larger; moreover, the course of the bullet was much more irregular. Large pieces of shell sometimes caused immense destruction of tissues, with almost instant death, and yet such cases sometimes recovered.

I have a report on saber, lance, and bayonet wounds which I will venture to quote: "The wounds from Cossack lances are large and of

the most serious nature; for not only does the point enter the body, but the entire weapon up to the handle. Such wounds are almost inevitably fatal, the wounded dying on the field or *en route* to the dressing-station."

In considering bayonet wounds, a word must be given to the weapon. The Russian bayonet is rapier-shaped. It is made for thrusting, not cutting, and it inflicts only punctured wounds, the edges of which quickly contract upon withdrawing the weapon.

The Japanese bayonet is a knife, long, strong, pointed, and sharp, and with it not only can punctured wounds be inflicted, but incised, contused, and lacerated wounds as well. Wounds of the abdomen caused by the Japanese bayonet were generally long gashes, through which the abdominal cavity was emptied of its contents, causing speedy death.

The chief operating surgeon above quoted, in summing up his conclusion as to battle-field injuries generally, said that to recommend the doing of laparotomy in a divisional mobile military hospital during the progress of battle, with a constant inflow of wounded, is unwise. "From among several evils, the least should be chosen, and time and strength are not available for such operations under such conditions. These abdominal cases should not be operated on, but should be given rest, temporary dressing, and morphine."

Finally, he said, active surgical interference in abdominal cases depends upon the temporary location of the wounded, his condition, and upon the kind of weapon with which the wound was inflicted. The result of treatment depends upon the method adopted, and in all such cases absolute rest is essential for at least a week. Morphine is our sheet-anchor in all wounds of the abdomen.

I heard nothing but praise for the first-aid packet, which was carried by every officer and enlisted soldier. The officer usually attached the packet, to the scabbard of his sword, thus assuring its constant presence, for a Russian officer is never without his sword.

The soldier was supposed to have a special pocket in the front of his breeches, on the right side, which was devoted to the first-aid packet, but, so far as I saw, this rule seemed more honored in the breach than in the observance, though a place was always found for the packet somewhere.

The Russian first-aid packet was much like ours in general appearance and size. It contained 1 antiseptic bandage of sublimated gauze, 3 m.; 2 antiseptic compresses sublimated gauze and cotton; 1 safety-pin.

These were hermetically sealed in a rubber (waterproof) cover, and the packet was thus issued for use at the dressing-stations, etc., but when issued to the men it had an additional cotton-drill cover, on which was printed a list of contents and the following directions:

"1. Take off the outer (cloth) cover.

"2. Open the (rubber) package, take out the compresses, and place on the wound—absolutely dry.

"3. Apply the antiseptic bandage over the compresses — but not too tight.

"4. Fasten the end of the bandage with the (safety) pin.

"*Notice.* In case of a perforating wound, place one of the compresses over each opening."

Of the practical use of the packet, a surgeon wrote that he was much impressed with the care shown in distributing the first-aid packet, and the careful way they were carried by officers and men. The first-aid bandaging was readily done by the men, though not under strictly aseptic conditions; nevertheless, though the heat was great and flies plentiful, there was no sign of infection during the first twenty-four hours. The first-aid packet proved of invaluable service to the wounded during transportation. Dr. Wreden objected to the red dye in the gauze, which he thought occasioned a cutaneous inflammation, aggravated by heat and perspiration. But might not this have come from the sublimate itself? He suggested that the gauze should be soaked in a 5–10 per cent solution of creosote, the especial advantage of which is that it would keep flies away from the dressing.

The first-aid packet has passed beyond the experimental stage, and is now universally recognized the world over as a legitimate part of the soldier's field equipment. It has both a positive and a negative value — positive because of its appropriateness, and negative because it prevents the use of an inappropri-

ate dressing, which would surely happen if a proper dressing was not available.

The consensus of opinion among Russian surgeons with whom I discussed the matter was that rifle-bullet wounds were usually sterile, and wounds from artillery projectiles usually infected. In summer there was much less wound infection than in winter. This is explained by the fact that the body and clothing were more frequently washed in summer than during the cold season, and that the clothing was lighter and less likely to harbor infection. I find this somewhat startling statement in a report to the Emperor, under date of April 15, 1905: "The last evacuation [Mukden] was carried on in excellent manner, being completed only by the difficulty in healing the wounded, who suffered from blood-poisoning and gangrene, resulting from fur clothing and cold weather." A surgeon told me that after Mukden there were many cases of frost-bite, and there was also a peculiar anæmic condition with purpura, which some of the physicians thought was due to the cold, which reduced the fibrinogen. I fancy they had not seen much scurvy in their practice up to that time. Another surgeon told me that after the battle of Sandipas a number of wounded were frozen to death as they lay on the ground.

I inquired of many surgeons if they had used or seen used any new or special method of treatment, but none had. Dr. Shaffer of the German army told me he had not infrequently observed the Russian surgeons painting the surface about wounds with tincture of iodine, but he did not learn the reason therefor.

I could get no exact information as to the percentage of infected wounds that came under treatment.

The surgeons at Irkoutsk told me that all the cases they received were infected. By the way, that reminds me I saw six cases of hip-joint amputation in one Red Cross hospital there, all of which were doing well.

Tetanus was not an infrequent complication of wounds. In the surgical clinic at Harbin, through which seven thousand patients had passed, there were twelve cases of tetanus, of which two recovered. The serum treatment was ineffective.

The statistical officer at Harbin reported that tetanus was in the proportion of less than two to each thousand of wounded. Of the two hundred and fifty cases of tetanus, eighty-seven per cent died.

A surgeon said that his largest number of cases of tetanus occurred after Mukden. He got the best results from chloroform and chloral, but nothing from antitoxine.

Erysipelas was always present, and it totaled five cases per thousand of wounded.

I believe that the latest surgical procedures were employed in the hospitals in the Far East, though I saw a great many more surgical cases in the wards than in the operating-room.

Rubber gloves were not generally used; in fact, I think their routine use was only required in the German Red Cross hospital, though I occasionally saw a pair in the Russian hospitals.

Silk was universally used for ligatures and sutures. The Russian surgeons were quite emphatic in their condemnation of animal ligatures in field service, and some of them told me they never used any other than silk ligatures under any circumstances, as there was no certainty of sterility in any other suitable material. Dr. Chervinsky told me that linen thread treated with celloidin was quite as good as silk, and much cheaper. So far as observed, the surgical armamentarium was good. In the beginning of the conflict there were obsolete instruments on hand, which, as with us, were thrown in to meet the emergency, and quickly disappeared, to be substituted by modern instruments. Regarding instruments, a Russian surgeon wrote: "I am sorry to say that I saw (May, 1904) many instruments with bone handles. There was a great shortage of artery-forceps and hypodermic syringes. The recently introduced lamps proved of the greatest service, especially after Liao-Yang, where we worked three days and nights. This battle not only illustrated the advance made in surgery, but also the great improvement in weapons. We can figure one dead to three wounded."

I have not burdened this paper with an account of the many interesting surgical cases I saw in the Far East, but, so far as possible, have endeavored to deduce lessons for our own guidance from the general surgical experience of the war.

We learn therefrom that there is no occasion to modify the views heretofore held, that cœliotomy, or indeed any major operation, on the field of battle is interdicted. In such cases, expectancy is the correct procedure, and rest and morphine the treatment. The suggestion that we should follow the rule of the ancient warriors, who went to battle in clean raiment and a clean body, is valuable. Add to these an empty stomach and bladder, and there is little left to be done but trust in Providence. If wounded, keep the wound clean, and give nature a chance, at least until a permanent hospital is reached.

PRACTICAL BACTERIOLOGICAL STUDIES IN THE SURGICAL CLINIC [1]

By WILLIS G. MACDONALD, M. D. Albany, New York

STANDARDS of aseptic surgical technique vary, in different clinics, from the most primitive to the most elaborate and involved systems. The ultimate results obtained are often identical under both conditions. No standard, however great its merits, can be maintained without constant attention to the minutest detail. In clinics where the *personnel* is permanent, where few changes occur in the operating-room, a system may be maintained with comparative ease. This is especially true when the surgeons, the assistants, and the nurses have healthy enthusiasm and friendly co-operation in their work. On the other hand, the problem becomes difficult in other large clinics, associated with teaching hospitals, having training schools for nurses and resident physicians, who serve only for a brief period. All the nurses in training are employed for a term in the operating-room and participate in operations, and the internes are early at the operating-table. Many of them are absolutely unfitted for the work, both by temperament and education. Under such conditions the most painstaking supervision is required.

Experience demonstrates beyond contradiction that surgical asepsis cannot be taught by didactic lecture. It can be learned only by practical experience in which the sources of infection are made real and tangible. The routine employment of bacteriological studies in the surgical clinics becomes indispensable where a high degree of efficiency is technically maintained. Bacteria, to be appreciated by interne and nurse, must be seen. In every hospital, occasional and unexpected sepsis occurs at longer or shorter intervals; a condition that should be met by a frank, fair, and immediate investigation to fix the source and establish the responsibility.

If, in any division of a hospital, wounds do not heal without sepsis, the trouble can be usually traced to inefficient skin preparation by the nurse in charge, or to a negligent resident surgeon. An unannounced visit for the purpose of taking cultures from all the wounds, dressings, and accessories from the hands of the nurses and resident surgeon acting as dresser will go far to remedy the difficulty. If, after a few days, all the cultures taken are demonstrated in the ward, and present a single bacterian as a common source of all the infections, and that the organism is on the hands of both resident and nurse, much will be accomplished. Subsequent cases for operation coming from the infected wards should have small portions of the skin excised from the border of the freshly made wound, the antiseptics neutralized, and the whole portion placed in a large culture of nutrient bouillon. As a test, a little further attention to the care of utensils in preparing patients for operation and at dressings will add to the completeness. A recent experience occurring in a single pavilion of a large hospital is here given. There was no *dangerous infection* or *marked constitutional reaction* in any case. *Superficial suppuration in the wound*, latent indurations, and late infections two weeks after operation were the usual manifestations.

[1] Read before the American Surgical Association, Cleveland, Ohio, May 31, 1906.

In the other divisions of the hospital, healing was most satisfactory.

Ordinary criticism and remonstrance were not followed by improved conditions; on the contrary, the nurse in charge and the resident surgeon were both confident that the infections came from catgut. Bouillon cultures were taken, generally without notice, from wounds, prepared hands, dressing, and utensils, and placed in a thermostat, and after thirty-six hours and afterward, plated. The dressings were uniformly sterile; nearly all the wounds and hands were contaminated either by a single, constant, or multiple variety of bacteriam. A micrococcus identified as the streptococcus pyogenes aureus was constant. Its original source was traced to a patient suffering from a rather chronic inflammatory process treated by hot fomentations and by frequent dressings. In order to satisfy fully the requirements of the situation, nearly a hundred cultures were taken, including transfers to solid media; a considerable labor. The results attained, however, were commensurate; every nurse and interne knew a streptococcus as a living and dangerous entity, having size, form, arrangement, and cultural individuality,—a menace to asepsis, real and tangible. Further, there was more isolation of infected cases, there was more exactness in the preparation of patients, and the resident surgeon knew more of the philosophy of rubber gloves than ever before. The *personnel* of that surgical division were made to feel that they were distinctively on trial. The ultimate result was the total absence of preventable sepsis in that division for a period, but it awaits a recurrent storm, unless laboratory methods are re-employed at irregular intervals and without notice.

Another condition occurred in a large hospital of modern construction, with operating-rooms of the most approved aseptic architecture. A conflict of opinion occurred, concerning who was to clean the walls and furniture; whether the *nursing* or the *domestic* department was to do the work. The natural consequences followed; the rooms were not cleaned nor sterilized at sufficiently regular intervals. A board of governors with little knowledge said "that the air is not a source of contagion" (they had read this in a surgery that stated that that was a notion of Lister's, exploded long ago, and that patients do not ordinarily come in contact with the floor and walls of operating-rooms). They failed to provide for necessary cleaning until over two hundred cultures were taken, demonstrating the air as a source of infection, through suspended matter. As a fair test, Petri dishes, fifteen centimeters in diameter, containing nutrient agar with glycerine, were exposed for twenty minutes in various parts of the general amphitheater during the beginning of a surgical clinic. Each plate demonstrated from forty-three to ninety-four colonies, and in each plate the staphylococcus pyogenes aureus was demonstrated. A repetition of the experiment, under identical conditions, a day later, after a thorough domestic cleaning, showed an average reduction to thirty colonies to each plate, with practically no pathogenic organisms, chiefly air bacteria and molds remaining. Conditions were practically identical in all of the smaller operating-rooms. The results of these preliminary examinations lead through the demonstration of the culture to a satisfactory arrangement in the domestic cleaning of the operating-rooms. The writer yet feels that his crusade for frequent cleaning with water and soap has not added materially to his popularity with the constituted authorities of the institution.

A source of infection too frequently not considered is the fine spray of infective saliva expelled from the mouth during conversation. Miller demonstrated over eighty varieties of micro-organisms found in the mouth under ordinary conditions, many of which are pathogenic. The usual pathogenic varieties are commonly found. Mendes de Leon (*Ueber die Gefahren der Mundinjection durch das Sprechen bei Operationen*) took stenographic notes of the conversation of operators and assistants during different operations, and afterwards counted the words spoken; they varied from 110 to 354 words, many of which were expletives and unnecessary descriptives of the operation. The operations required from twenty to forty-five minutes, and presented no unusual features.

Hübener, in his experiments in the von Mikulicz clinic, placed agar plates the size of the usual field of operation fifty centimeters from

the face, the usual distance of an operator's face from the wound. After speaking, at intervals, for ten minutes, about 200 words, toward the plates, under ordinary conditions of voice and without a mask, the colonies were developed. The results varied from 436 to 581 separate and distinct colonies. The writer has conducted on a purely practical basis a considerable group of similar experiments, the technique being as follows:

A Petri dish fifteen centimeters in diameter, containing glycerine-agar, is placed the ordinary working distance from the surgeon's lips. The words ordinarily required during a typical operation are spoken toward the plate, after which it is placed in a thermostat and the colonies developed and counted.

GROUP 1. Sixteen cultures. The results among four persons speaking without masks were as follows: Dr. M. (the writer), 5 trials; most, 431 colonies; least, 286 colonies; average, 348 colonies. Dr. G., 5 trials; most, 458 colonies; least, 241 colonies; average, 327 colonies. Nurse J (who spoke very low, with closed lips, and was rebellious to the experiment, because she disliked wearing a mask during operations), 3 trials; most, 157 colonies; least, 95; average, 117 colonies. Nurse S., who acted fairly, 3 trials; most, 386 colonies; least, 295; average, 331 colonies.

GROUP 2. Same conditions, only masks covered with four layers of aseptic gauze were worn. Dr. M., 5 trials; most, 68 colonies; least, 46; average, 54 colonies. Staphylococcus pyogenes aureus found twice. Dr. G., 5 trials; most, 52 colonies; least, 31; average, 43 colonies. Nurse L., 3 trials; most, 41 colonies; least, 11; average, 22 colonies. Nurse S., 3 trials; most, 49 colonies; least, 17; average, 31 colonies.

GROUP 3. Same conditions as group 2, except that mouth was washed and teeth cleaned with a solution of boric acid, did not show any material improvement in the average number of colonies.

GROUP 4. Same as group 2, except that masks covered with eight thicknesses of sterilized aseptic gauze were used, and the total average number of colonies was reduced to seven, one fourth of the plates remaining sterile after exposure.

One can readily imagine the conditions involved in a demonstration operation where the unmasked operator lectures as he operates to a crowded clinic and is surrounded by assistants and visitors. It is no wonder that disturbed wound-healing, with leucocytosis and so-called surgical fever, occurs occasionally. An active phagocytosis and a physiological immunity are important factors in securing asepsis; elements that cannot be definitely measured as yet, under the individual conditions of practical surgery, or in the experiment laboratory.

The preparation and the duty rooms in the operating pavilion require frequent bacteriological provings. Brushes and rubber gloves prepared for operations are not always sterile. The duty of their preparation is detailed to a nurse in training, under supervision, to be sure, and with specific direction, but difficult powers of observation, lack of absolute knowledge, or the absence of personal integrity may lead to insufficient preparation and infected gloves and brushes. The irregular but constant taking of cultures, with judicious praise of the work when the cultures are found sterile, and the demonstration, publicity, and wholesome criticism of infection, and the establishment of personal responsibility in the nursing force, are the only practical safeguard.

Trusting that a brief digression may be allowed for the discussion of sterile catgut, the writer wishes to state that no known method employed will uniformly be satisfactory, even in the most painstaking hands. This statement is especially true with relation to chromicized catgut. The catgut placed upon the market by our best firms is occasionally infected, especially the large sizes. This is no matter of opinion, but one of actual laboratory experiment, with unquestionable demonstration. Every quantity of catgut prepared should be tested by special methods, bacteriologically, before using in wounds. The cumol and a modified Claudius methods have been most employed. By exact methods of preparations, sizes up to No. 3 are reasonably safe. Absorption, however, occurs too early to make these sizes of catgut safe in hernia and abdominal section wounds.

Visitors to operations, either the attending physician of the patients, or visiting physicians, or students, are a constant menace to surgical asepsis, even though their clothing is covered by sterile gowns. In their anxiety to see the details of the operation, they crowd upon the field of operations, ask questions, cough near the instrument-table, and bring large quantities of macroscopic dirt on their shoes to the operating-room. Air cultures, taken at all my operations for a period of three months, in over one hundred and fifty experiments, showed that

the number of spectators influenced the numbers of colonies which developed on the agar-plates. The ratio of colonies to visitors was reasonably consistent. Keeping the operating-room floors well sprinkled with plain water reduced the number of colonies about one third. The results were, however, not sufficiently uniform to be authoritative.

The ultimate conclusions of this continued study followed along many other lines in the bacteriology in the clinic are definite and valuable, although not new.

1. The distinctive necessity of constant cultural work, in order that the *personnel* of the clinic be made alert and to feel a *personal responsibility*.

2. To establish consistent daily detail work, both on the wards and in the operating-room, without constant criticism.

3. To be able to trace to its source occasional infection, and remedy it before serious damage occurs.

4. To establish the inefficiency of many plans recommended in medical literature, which are essentially fallacious; for example, the four-fold gauze mask.

There remains another and equally important function of surgical bacteriology, the discussion of which is forbidden by the limitations of time; namely, its purely clinical and diagnostic value in tuberculosis, tetanus, and actinomycosis and other infectious processes.

THE USE OF THYROID EXTRACT TO SHORTEN COAGULATION-TIME OF THE BLOOD[1]

By WILLIAM J. TAYLOR, M. D., Philadelphia, Pennsylvania

Attending Surgeon to the Orthopædic Hospital and Infirmary for Nervous Diseases, and to St. Agnes Hospital; Consulting Surgeon to the West Philadelphia Hospital for Women

IT is not my intention to present an elaborate paper upon the effect of thyroid extract upon the general circulation, or to go deeply into the theoretical reasons for its administration, but simply to present a short note upon its internal administration as a means of shortening the coagulation-time of the blood, and to suggest that it be given a careful trial in all cases of accidental wounds, or where surgical operation is found absolutely necessary in hæmophilics, as well as in patients whose blood has been altered by disease.

All of us know with what feelings of apprehension surgical operations are undertaken in persons of a hemorrhagic diathesis and in those profoundly jaundiced from obstructive disease of the bile-passages, and with what serious consequences even trivial wounds may be followed. Indeed, J. Weckham Legg (1) goes so far as to say that in hæmophilics it is "hard to imagine a case in which the use of the knife would be justifiable."

Blood which is normal, and by this I mean blood which has the proper amount of coagulating element, is not affected by the administration of thyroid extract, even when this has been continued for a long time, and when the constitutional effects of its use have been so pronounced that it must be discontinued. It seems to act only upon blood which lacks that which has been called fibrin-ferment. This is well shown by a patient of Dr. John K. Mitchell, an old case of poliomyelitis, who was enormously fat, and, beyond palsy of her lower limbs, in perfect health. Very careful tests were made of her blood by Dr. W. B. Cadwalader every few days for nearly three weeks, during the whole of which time she was taking five grains of thyroid extract three times a day, in the hope of diminishing her weight. Owing to its action upon her heart, its administration was discontinued, but there was no appreciable effect upon the coagulation-time of the blood. This has been confirmed by Dr. J. C. Da Costa, Jr., in a series of

[1] Read before the American Surgical Association, Cleveland, Ohio, May 30, 1906.

examinations which he made of normal blood of patients to whom thyroid extract had been administered for various therapeutic reasons. All this would show that when the blood contains the normal amount of fibrin-ferment no effect is obtained whatever, either good or bad, but when this element is markedly diminished, it supplies it, either by a direct action upon the blood, or, as Dr. C. E. de M. Sajous thinks, by stimulating the anterior pituitary body. He (Dr. Sajous) considers that the secretion of the adrenals on reaching the lungs becomes converted into an oxidizing agent, i. e., the albuminous constituent of the hæmoglobin molecule. This substance he finds identical both with the "oxidase" of the French chemists and fibrin-ferment in its reactions, coagulating temperate, etc., and that when the functional activity of the adrenals is enhanced the volume of the fibrin-ferment in the blood is increased, which ferment, by uniting with fibrinogen, endows the blood with its coagulating property. He contends that the governing center of the adrenals is the anterior lobe of the pituitary body, and that this is kept active by the internal secretion of the thyroid. He believes that in administering thyroid extract we stimulate the anterior pituitary body, which in turn excites the adrenals to greater activity, and thus the proportion of fibrin-ferment in the blood is correspondingly augmented and its coagulating power increased.

A. E. Wright (2, *a*) states that the coagulation-time of the blood is lengthened by starvation, and shortened immediately after a hearty meal, and (2, *b*) that the efficiency of the action of calcium chloride can be augmented by combining it with a solution of cell neucleoalbumin; that is, with an albuminous substance which can be obtained from aqueous extract of cellular tissue, such as the thymus, thyroid, testicle, gastric, and other mucous membranes. He considers that the basis for rational therapeutics in hæmophilia, and the treatment of all cases of hemorrhage and aneurysm which are not accessible to surgical treatment should be in increasing the coagulability of the blood.

Wachenheim (3), in an elaborate article, states that the characteristic symptoms of hæmophilia is not spontaneous bleeding, but defective coagulation, and, as he calls it, a "toxanæmia with secondary autoimmunization to a quasi-normal function."

While perfectly willing to admit that surgical operations should not be undertaken in these cases, unless the condition is one which imperatively demands it, and thoroughly appreciating the great dangers, and even fatal bleeding which may occur, there are certain conditions and accidents met with in these unfortunates which demand treatment at our hands. It is for this reason that I bring the subject before you, in the hope that this method of administering thyroid extract as a definite preparatory treatment to surgical operative procedures may prove of value in cases in which the coagulation-time of the blood is greater than normal.

It has been stated by Fordyce (4) that large wounds sometimes prove less dangerous than slight injuries, and that enlargement of small wounds by free incision has at times served to check hemorrhage in these unfortunate cases.

A year ago I had under my care a woman of 38, who had all her life been a bleeder, and who had suffered intensely for many years from a movable kidney. She had constant pain, was unable to walk, could not be comfortable in bed, and had repeated crises in which there was suppression of urine with hydronephrosis, and accompanied with evidences of uræmic intoxication. The urine at times was loaded with blood and with other evidences of intense congestion. The condition was so serious that an operation to fix the kidney in place was urgently demanded. For many years she had bled profusely from the simplest wound. Furious and persistent bleeding had followed some years before an operation upon her nose, and about two years before she had bled from nearly all of her mucous membranes, and had had a series of purpuric spots in various parts of her body. As is usual in these cases, the menstrual flow was not abnormal. The coagulation-time of the blood when first seen by me was eleven and a half minutes, and the needle-prick of the finger bled for hours, and was only controlled by pressure. The hæmoglobin was 70 per cent, the red cells 3,350,000, and the whites 5,600.

Under careful and systematic treatment with iron, malt, massage, and feeding, and at Dr. Sajous's suggestion, the adminstration of three grains of the dried thyroid extract three times daily, the coagulation-time of the blood was shortened from eleven and a half minutes to three minutes and four seconds.

Operation was about to be undertaken when from causes other than those connected with her physical condition it was necessary for a postponement. Six weeks later, thyroid extract was again given for four days, and the coagulation-time was found to be two minutes and six seconds. The next day an incision was made in the loin, and the kidney fixed in place by means of sutures passed through dense adhesions which were found attached to the kidney as the result of former inflammation, but no sutures were passed through the kidney structure. The wound was remarkably dry, there being much less oozing than is usual in such operations, and she made a prompt and normal convalescence. Indeed, it was the driest wound I have ever seen in such an operation.

The second case in which it was tried was that of a boy of eighteen, a bleeder, and of a family of bleeders, upon whom I operated for necrosis of the fibula following an osteomyelitis, and until after the operation I did not know of his hemorrhagic tendency. The wound bled for weeks, the dressing being saturated continuously, and showed no disposition to heal, while the granulations were large, intensely congested, and bled on the slightest touch. Nothing in the way of treatment had any effect until he was given thyroid extract, when the improvement was immediate and most marked, and by the end of a week all bleeding had ceased from the granulations, and the wound began to heal rapidly, although no change had been made in the materials used in the dressing, or any other form of internal medicine employed. It is to be regretted that at this time no coagulation tests were made.

The third case was that of a woman of forty-five, who had been a bleeder all her life, and who, eight years before, had bled from the gums for forty-eight hours after the extraction of a tooth. She was subject to severe epistaxis at frequent intervals, and bled freely from her gums at all times from the slightest scratch. Fear of bleeding had prevented her for years from having two teeth extracted, but after she had taken three grains of thyroid extract for three days the teeth were pulled. She had no trouble whatever, in spite of the fact that the gums were badly lacerated by the dentist in his efforts to get at the roots of the teeth. There was no more bleeding than could have been considered normal.

These three cases were all unmistakable bleeders, possibly not true hæmophilics, but undoubtedly of a hemorrhagic diathesis, and the remarkable results following the administration of thyroid extract can only be attributed to its influence. In the first and third instances, hemorrhage would have been, almost certainly, a dangerous complication, and in the second, the sudden cessation of the oozing from the wound could only have been due to its influence.

The only record I have been able to obtain of the use of thyroid extract in profound jaundice is that of a case of Dr. Richard H. Harte, who has very kindly given me permission to report it.

The man, a miner, was thirty-seven years of age, who had been in the Pennsylvania Hospital in 1904 with a history of subacute jaundice, and slight hemorrhages from the mouth and bowels. Cholecystotomy was performed by Dr. James P. Hutchinson, who found no stones, but the gall-bladder was drained. There was free bleeding at the time of the operation and afterwards. Jaundice and bleeding from the mucous membranes continued for a year, and on May 8, 1905, his blood was examined, and its coagulation-time was found to be 4½ minutes. On June 2d the coagulation-time had lengthened to 12½ minutes. He was now given three grains of thyroid extract three times a day, with the result that the coagulation-time was steadily shortened, as in seven days it was 7½ minutes, and in thirteen days only 6½ minutes. The jaundice was not relieved, and death occurred from carcinoma of the hepatic duct with hypertrophic cirrhosis of the liver and duodenal ulcer. Dr. Harte opened the abdomen, but nothing could be done, owing to the nature

of the disease, and during the operation there was some hemorrhage, but this was not unusual in amount.

The result in this case in shortening the coagulation-time of the blood from 12½ minutes to 6¼, or a little over half, without there being any change in the intensity of the jaundice, is certainly interesting, and would suggest that a more extensive trial be made of it in other cases.

Mayo Robson has great confidence in the results obtained in these cases of jaundice from the administration of calcium chloride, and employs it as a routine measure of treatment, but in the hands of others its action is not so satisfactory, and many surgeons of large experience have ceased to employ it.

If, as I think possible, thyroid extract will cause shortening of the coagulation-time in these cases by materially increasing the fibrin-ferment, it will prove of great value as a practical method of diminishing the dangers from persistent bleeding in these cases.

I have not yet tried Wright's suggestion of combining the administration of calcium chloride with an albuminose, but when very rapid effect is desired, it would seem to be the best plan to be pursued, and the drug should be given at the same time as the thyroid extract.

METHOD OF EMPLOYMENT

In all cases of suspected or probably delayed coagulation, the blood should be carefully examined, its coagulation-time actually noted, by Wright's apparatus or that of Brodie and Russell, which Murphy and Gould (5, *a*) considered the most accurate, or even by the drop method with a warmed glass slide. Several tests should be made from blood taken from various portions of the same patient's body. Delayed coagulation with its probable want of fibrin-ferment being established, dried thyroid extract should be given in three-grain doses in capsule three times a day after meals.

The blood should be tested daily, if possible, and usually the effect of the treatment should be noted within forty-eight hours. Its action upon the heart should be watched, and its depressing influence be counteracted by full doses of strychnia.

Its value in controlling hemorrhage from various regions in the body, which are due to systemic conditions of relaxation, and not to local causes, is well known, and is being more widely employed, as well as in uterine hemorrhage, purpura and bleeding from the gum, and in scurvy.

Thyroid extract has been used with great good effect in several cases of purpura with spongy and bleeding gums in typhoid fever where all other methods of treatment had been ineffectual.

Whether further experience will confirm these observations can only be conjectured, but certainly in my own cases the results have been so marked and constant, that I purpose in every case of delayed coagulation, particularly when associated with a history of frequent bleeding, to give thyroid extract until its value as a therapeutic measure is established.

The methods employed of testing the blood of all of these patients has been that of A. E. Wright, which is very troublesome, and requires a long time to complete. I wish to acknowledge my indebtedness to Drs. Arthur Newlin and Frederick Fraley, Jr., for their aid, as all these examinations of the blood were made by them.

Murphy and Gould (5, *b*), in a series of six hundred examinations of the blood to test its coagulability, recommended the method of Brodie and Russell. They state that errors of technique are very easy, and the results may therefore fail for various causes, and that Wright's method failed to give results in their hands in fifteen per cent of the observations, while that of Brodie and Russell (7) failed in less than five per cent of their examinations. They made examinations of the blood in fifteen cases of jaundice from various causes, gall-stones, catarrhal jaundice, cholecystitis, cirrhosis of the liver, cancer of the liver, cancer of the head of the pancreas, and chronic pancreatitis, but failed to find that coagulation varied from the normal. This is certainly very interesting and instructive, and must be considered in estimating the value of this method of treatment, as it proves that delayed coagulation is not constantly associated with jaundice due either to benign or malignant obstruction.

Weil (8) has employed intravenous injection of beef serum with marked results in shortening the coagulation-time of the blood in hæmophilics, and recommends the serum treatment as a preventive measure in case an operation is contemplated upon a hæmophilic.

My object in writing this short paper is merely to place on record my own observations, and in the hope that the fellows of this association may deem the subject of sufficient value to test it in a large series of cases.

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CASE OF TRAUMATIC HEMORRHAGE INTO THE LEFT LATERAL LOBE OF THE CEREBELLUM, TREATED BY OPERATION, WITH RECOVERY[1]

By HAMILTON A. BALLANCE, M.S., Lond., F.R.C.S., Eng.
Surgeon, Norfolk and Norwich Hospital, England

THE patient was a boy, aged 12, and was admitted into hospital four years ago, suffering from severe headache, giddiness, frequent vomiting, unsteadiness in gait, and some weakness in the left leg, these symptoms having been present for a fortnight. There had been no fits, but the boy had become very drowsy the last two days. The only history bearing on the condition was that two months previously the boy had fallen on his head off another boy's back. The head struck the ground over the parietal eminence of the right side. He was somewhat stunned, but was able to walk home with assistance; the nose bled for a short time, but otherwise he appeared to be unaffected by the fall. There was no vomiting, and he was up and about the next day as usual.

Upon admission, the boy was in a condition of "cerebral irritation," lying curled up in bed on his left side, with hips and knees flexed, eyes tightly closed, and he resented being spoken to or interfered with in any way. Any attempt to retract the neck appeared to cause much pain. The temperature was 100°, pulse 80 and regular. The pupils were equal and of medium size; both reacted well to light and accommodation; there was no ophthalmoplegia, but well-marked double optic neuritis.

There was great difficulty when he attempted to walk; he took short, unsteady steps, reeling from side to side and dragging the left foot; there was a tendency to fall backwards and to the right. There was distinct weakness, and some inco-ordination of the left arm and weakness of the left leg, but the face was unaffected. The left knee jerk was a little exaggerated, the right diminished; there was no ankle clonus. The cutaneous reflexes were present and equal; there was no anæsthesia. Vomiting was frequent.

Upon trying to sit up he complained of severe frontal headache and giddiness. When giddiness was present, the objects in the room appeared to move across him from left to right, and he himself seemed to be going in the same direction. This particular observation is in accordance with the clinical results obtained by Stewart and Holmes, and published recently in *Brain*, that in intracerebellar lesions, external objects appeared to move from the side of lesion to the normal side, and that the sense of movement of the individual was in the same direction as that of the external objects, whereas in an extracerebellar lesion the sense of personal movement was in the opposite direction to that of the external objects.

He was kept under observation in the medical ward for ten weeks. At the end of the first fortnight some weakness was apparent in the lower part of the face on the left side, lateral nystagmus to the left developed, and there was paresis of the conjugate movements of the eyes to that side; there was no squint. The sight became progressively worse, and finally he was not able to read half-inch type at fifteen inches: this should have been possible at nine yards.

The inco-ordination in the left arm on purposeful movement and the weakness increased, so that he was only just able to raise that hand above the head. He vomited every day, often many times a day, and complained of much headache.

[1] Read before the American Surgical Association, Cleveland, Ohio, May 30, 1906.

During the latter part of the time the patient was under observation, he improved considerably, in so far that the headache, giddiness, and vomiting almost entirely disappeared, but the weakness of the limbs on the left side and the difficulty in walking remained.

An operation was performed five months after receiving the injury. An opening in the bone over the left lobe of the cerebellum was made, measuring 2½ by 2¼ inches. Owing to the free hemorrhage and some embarrassment of respiration during this procedure, the skin flap was then replaced and the dura mater left intact.

A fortnight later the wound was again opened up and a flap of dura turned down. The cerebellar substance immediately bulged freely through the opening. The outer surface of the cerebellum as far forwards as the posterior surface of the petrous was thoroughly examined, but no tumor found between it and the dura. The little finger was then thrust into the substance of the lateral lobe, and at a depth of 1¼ inches a soft, smooth, rounded body could be felt about 1¼ inches in diameter, and not incorporated with the surrounding brain substance. Enucleation with the finger was attempted, and rather more than half of the circumference had been separated from its bed when the tumor was felt to give way, and dark, almost black, clot came out along the track made by the finger. Decolorization was commencing in this clot; there was no capsule to the mass. The whole of the clot was removed and no evidence was found that the case was one of hemorrhage into a new growth. After the removal, the cerebellum receded within the skull to a depth of three quarters of an inch. The dura and the skin flap were then sutured in position. Before the clot was enucleated, the respirations were very shallow and showed signs of failing altogether, but they at once improved after the clot had been let out.

The boy made a slow but uneventful recovery, and three months after the operation could walk without unsteadiness, and the sight was rapidly improving. All headache and giddiness had disappeared.

At the present time, four years after the operation, the boy is in excellent health. In walking, he can turn suddenly round without reeling. There is still a slow lateral nystagmus of large excursion to the left, that is, to the side of lesion, and oscillation is also present on upward movement of the eyes. Vision is almost normal in each eye. The grip of the left hand is weaker than that of the right; dynamometer, right 65, left 50. A little incoordination is still present in the left arm, on intentional movement. Power in the legs is equal on the two sides, the knee jerks are equal, and there is no ankle clonus.

Remarks. Primary apoplexy of the cerebellum is exceedingly rare, as compared with that of the cerebrum. Of 96 consecutive cases of apoplexy occurring in a large London hospital, in only one case was the hemorrhage confined to the cerebellum. Almost all recorded cases of cerebellar hemorrhage are due to disease, and in a hurried look through some of the literature of the subject, which, I regret, has not been by any means exhaustive, I have found only one case of primary intracerebellar traumatic hemorrhage, and no instance of such a case being submitted to operation. The case in point was published by Dr. Ratcliffe in the Birmingham *Medical Review* for 1894. It was that of a boy of ten, who fell from a four-foot wall, on his head. He walked home twenty minutes later, and complained of great pain and tenderness over the back of the head on the left side. He vomited frequently. There was no external injury to the head or paralysis of arms or legs. He died of failure of respiration 4½ hours after the accident. At the necropsy there was found a hemorrhage into the middle lobe of the cerebellum three quarters of an inch in diameter; this had burst into the fourth ventricle, and had extended into the third and lateral.

In most of the cases of cerebellar hemorrhage the extravasation is extensive, and it would appear that the superior cerebellar artery is the vessel most liable to rupture. The pressure of the blood is so great that the pons on the same side is not infrequently affected, and paralysis on the opposide side of the body results, as has been recorded in some of these cases. Thus a sudden hemorrhage into the cerebellum may differ from a slow growing tumor as regards the side on which the paral-

ysis is found, although one case is recorded by Dr. Thacher in the *Proceedings of the New York Pathological Society*, vol. xv, of a spontaneous hemorrhage into the left lobe of the cerebellum of a man, which caused paralysis of the limbs on the same side of the body.

The rarity of my case is hardly the reason for recording it, but I bring it before this meeting more for the purpose of drawing attention to the fact that a hemorrhage into the brain may exactly simulate a new growth, and that paresis of the homo-lateral limbs, weakness of the conjugate movements of the eyes, and lateral nystagmus to the same side may be valuable localizing signs of cerebellar disease.

The latent period of six weeks from the accident to the onset of symptoms should be noted.

Some brain operations, although very difficult in anticipation, turn out to be very easy in performance, a consideration which should deter us from refusing the relief which surgery may afford to sufferers from intracranial disease.

ACUTE INTUSSUSCEPTION IN YOUNG CHILDREN [1]

By ELSWORTH ELIOT, JR., M. D., New York City

THE consideration of intussusception in its entirety would not only require too much time and space, but would also occasion needless repetition of many phases of a subject already fully understood and duly classified. There is still an opportunity, however, for increasing the general stock of information, not only in the diagnosis of obscure cases, but also as to the indications and character of the particular method of treatment employed for its relief. In fact, the writer's attention was directed to this subject by an obscure case of enteric intussusception (case 1) in which the correct diagnosis was made only on exploration of the abdomen, and he was still further led by the fatal issue of an irreducible gangrenous intussusception in an infant (case 6) to consider and if possible to devise some more rational method of treatment by which the excessively high mortality of resection for this condition could be materially lowered.

Of all the different varieties of intussusception, the ileocæcal is by far the most frequent, and almost always attacks infants and very young children. A search of the literature (if that can be used as a criterion) seems to establish the fact that it is most common in England and in the United States, less common in France, and least common in Germany. With advancing age, ileocæcal intussusception decreases in frequency and the enteric becomes more prevalent. Thus in the tabulated list of Gibson (1), of 25 cases where this variety was found at operation or at autopsy, 2 were 1 year old, 5 between 1 and 5 years old, 8 between the tenth and twentieth year, 4 between the twentieth and thirtieth year, 1 between the thirtieth and fortieth year, 3 between the fortieth and fiftieth year, and 1 each of 54 and 63 years of age.

In a later series, collected by the writer, of 23 cases, 3 were under 1 year old, 9 between the first and tenth year, 4 between 10 and 20, 6 between 20 and 30, and 1 between 30 and 40.

Smith (2) declares the frequency of enteric to be thirty per cent, but this, in the writer's experience, seems to be too high.

That the ileocæcal and enteric varieties should occur most frequently in infants on the one hand, and in children and older people, respectively, on the other, seems to be accounted for by the fact that in infants the cæcum is provided with a long mesentery, permitting wide excursions of that viscus even as far as or beyond the anal orifice, when, as a result of exaggerated peristalsis, or from the irritation of some temporary bowel difficulty, an intussusception develops. With increasing age

[1] Read before the American Surgical Association, Cleveland, Ohio, May 30, 1906.

the cæcum becomes more and more fixed to the posterior abdominal wall, and thereby increasingly less capable of extensive movement, while the small intestine retains its mesentery, and consequently its mobility. Furthermore, the infant, after the first eighteen months, outgrows the tendency to all abnormal conditions arising from faulty digestion, while as children, and after they reach adult life, they become more susceptible to intestinal polypi, enteric fever, and to the various pathological conditions associated with Meckel's diverticulum and the appendix. Thus in the writer's series of 28 cases, typhoid fever shortly preceded the development of an enteric intussusception in 3, in another there was a history of typhoid fever one year previously, and in 3 cases an inverted diverticulum was found at the apex of the intussusceptum; viz., cases of Terry (3), Morrison (4), and Smith (2). In Gibson's series, already referred to, the original histories make no mention of a previous typhoid or of Meckel's diverticulum.

Of greater interest than the ætiology of enteric intussusception are the different symptoms by which it is manifested. In the ileocæcal variety, a certain regularity of symptoms is observed, which usually varies only according to the extent and degree of the associated constriction. In fact, the diagnosis is probably made in most cases by the careful and experienced observer shortly after the appearance of the symptoms of obstruction. In the enteric variety, however, the clinical picture is by no means always the same, for although repeated vomiting, at first of the stomach contents, and subsequently, where no operation was done, of intestinal contents, together with abdominal pain, seem to have been constant symptoms, yet the symptoms referable to the frequency and character of the stools vary widely. To be sure, in one case (6) of multiple enteric intussusception, where the highest intussusception was 30 inches below the pylorus, there was one attack of hæmatemesis. Moreover, in Abbot's (3) case (Gibson series), both the vomiting and the pain occurred only after taking nourishment; but these are exceptions. On the other hand, analyses of 26 cases taken from both series, in which an adequate history was given, show that in 11 there was no movement of any kind, not even the passage of flatus; that in another, complete obstruction followed a single movement shortly after the invasion; that in a third a condition of obstruction was followed by bloody stools prior to the operation; that in 7 cases bloody stools were observed, although in two of these cases, only very small amounts were seen after an enema (possible abrasion of the rectal mucous membrane); that in another, bloody stools occurred only after the intussusception was relieved by operation, the symptoms prior to operation having been those of complete obstruction. In these same seven cases, one occurred during a typhoid convalescence, while in a similar case no mention of any stool is made, probably because operation was done six hours after the appearance of the initial symptom, for supposed typhoidal perforation. Finally, in Abbot's case (3) there was no movement for six days prior to operation, but during this time more or less constant passage of flatus was noticed.

In this same series of cases the physical examination is frequently incomplete. In six cases no tumor could be felt, possibly owing to the distention. In ten cases a tumor was present, and in all but one was situated on the right side, the sole exception being placed in the left iliac fossa. It was generally detected either just above or just below the level of the umbilicus, in one case being in the right hypochondrium, while in another it was just above and parallel to Poupart's ligament. In one recurrent case the tumor was intermittent, while in another (where the tumor was placed in the left iliac fossa) it could be depressed and felt through the anterior rectal wall. In the writer's case the tumor was straight and freely movable (even after opening the abdominal cavity), and intermittent (it had disappeared after the administration of an anæsthetic, and no pelvic examination was made). Such a free mobility of the tumor, sufficient to permit of its concealment in the pelvis, is probably due to the length of the mesentery, while its greater frequency on the right side may be explained by the oblique position of the attachment of the base of the mesentery to the vertebral column (from above down and to the right). Usually the tumor is described as sausage-shaped, namely, concavo-convex.

In the writer's case it was perfectly straight, although the intussusception was eighteen inches long.

In ten cases, distention is mentioned; only in one is its absence noted. In two cases of six and of ten days' standing, there was visible peristalsis.

Not infrequently a diagnosis of appendicitis or of perforation was made, the actual condition being revealed by operation. This was the writer's experience, where the symptoms were thought to be due to an insidious perforation, a possible appendicitis or a suppurating mesenteric gland.

On the other hand, although the symptoms of the ileocæcal variety occurring in young infants do not vary widely, yet error in diagnosis and subsequent delay of operation is not infrequent, and this is not surprising, for, owing to the child's age, all symptoms are necessarily objective, and the negligent parent or the careless practitioner is led by the bloody mucous stools to diagnose dysentery. To be sure, unusual symptoms are observed occasionally, but these are generally the result of coincident multiple intussusceptions, as in a case reported by Bryant (6), of a female nine months old, where two tumors were noticed, one above the level of the umbilicus, the other in the left iliac fossa. Both tumors were movable, and although bloody mucous stools were present, no mass could be felt in the rectum. On operation, the first-mentioned tumor proved to be in ileocæcal intussusception extending into the transverse colon, while the last-mentioned tumor proved to be an intussusception of the descending colon separated from the apex of the former by four inches of empty colon.

Case 1. Referred by Dr. Tuttle. A. G., aged 8, female. Admitted to the hospital September 6, 1905, with a diagnosis of typhoid fever. This ran the customary course, free from any complication, until the forty-eighth day, when, during the afternoon, the patient began to complain of abdominal pain, more marked in the left lower quadrant. The pain was of a griping character and intermittent. There was nausea, but no vomiting. Several hours afterward the abdomen became slightly distended, and there was moderate rigidity and tenderness over the left lower rectus. A low enema brought away some gas and several liquid yellow stools, followed by relief of the pain and disappearance of the distention. The tenderness, however, persisted. During that night, the patient slept without interruption, and was awakened in the early morning by a return of the pain and the development of tenderness to the right and just below the level of the umbilicus. In this situation an elongated oblong mass could be felt, slightly movable in all directions. At 4 A. M., the temperature was 99.6°, the pulse 118. At 8 A. M., four hours later, the temperature was 98.4°, but the pulse had increased to 140. During the same interval, the general leucocytosis had increased from 12,000 to 33,000. Shortly after waking, the patient began to vomit, the vomitus consisting of the content of the stomach, and persisting at intervals throughout the day.

On examination at 2 P. M., the abdomen is symmetrical and free from distention. There is a distinct mass about three inches long and one and a half broad, below and to the right of the umbilicus. This mass has a smooth, even surface, and is very slightly tender and moderately movable from side to side. There is very little if any rigidity. There is no indication of either gas or fluid in the peritoneal cavity. Rectal examination negative.

Under gas and ether anæsthesia, an incision was made along the outer border of the right rectus muscle, below the level of the umbilicus. The peritoneal cavity contained at least three pints of free serous, odorless fluid. The appendix was quickly exposed, and found to be normal. The mass, which had disappeared under the anæsthetic, was found in the pelvis and easily brought into the wound. It consisted of an intussusception of the small intestine about eight inches long, but no time was taken to determine its distance from the ileocæcal valve. The intussusception was reduced by expression and slight traction, and was then fixed at either side of the point of constriction by plain catgut sutures to the edge of the peritoneum. No induration or ulcer could be felt through the wall of the small intestine at or in the area of the invagination. After reduction, the affected intestine was moderately thickened and swollen, and of a dark mottled color. In places, it had also lost its glistening appearance. There was, however, no loss of resiliency. The abdominal wound was completely closed without drainage.

There was immediate cessation of both pain and vomiting. The pulse remained from 120 to 130 for 48 hours and then decreased gradually to around 100. The bowels moved on the day after operation, and thereafter at regular intervals, and at no time was there either blood or mucus in the stool. The wound healed by primary union.

Two weeks after the operation, patient had two sudden, sharp attacks of pain just below and to the right of the umbilicus, with an interval of twenty minutes. There was one attack of vomiting. Examination revealed some tenderness in the area of pain. An enema brought away a number of large scybalous masses, and later a good movement took place, with complete relief of all symptoms.

Again, after another fortnight, the patient having left the hospital, a similar attack of general abdominal

pain appeared after the bowels had been constipated, and the patient vomited several times. On the following day the symptoms still persisted, and the patient vomited once more. An enema, however, relieved all the symptoms. Since that time the patient has enjoyed the best of health.

In order to facilitate the discussion of the treatment of intussusception, a brief statement of its gross pathology seems desirable. Apart from its location and the possible multiplicity of the intussusception, and solely with reference to its reducibility and viability, we find conditions quite analogous to those of hernia, in that the intussusception may be completely reducible and viable, or reducible and not viable, or irreducible and viable, while in the more advanced cases of irreducibility a condition of strangulation exists. In the latter instance, however, the resulting gangrene first attacks the intussusceptum, and although later the intussuscipiens may become involved as well, it is nevertheless quite possible for it to remain viable throughout. An interesting proof of this fact is furnished by those cases of intussusception in which recovery ensues without operation, after the discharge of the necrotic intussusceptum per rectum.

In every case of intussusception, interference with the return circulation, as in strangulation from any cause, leads to the collection of a serous or of a serohemorrhagic exudate into the peritoneal cavity. This shortly afterward becomes, first, turbid, and, with the invasion of a septic peritonitis, with or without perforation, purulent.

Without any special consideration of the treatment of the subsequent associated peritonitis, the treatment of the intussusception naturally resolves itself into the treatment of the (*a*) reducible variety, (*b*) the irreducible variety, the gut being viable; (*c*) of the irreducible variety, with gangrene of the intussusceptum only; and (*d*) of the irreducible variety, with gangrene both of the iutnssuscipiens and of the intussusceptum.

The object of the treatment of the first-mentioned variety is reduction. This may be accomplished in favorable cases by the inflation of the bowel with air, or by the use of an enema, or by aparotomy. A statement of the relative advantages of these different methods is unnecessary. Subsequent to the introduction of aseptic methods, the inflation and injection methods have gradually been superseded by operation, for they can neither be practised without risk of rupture, nor, even when successful,do they always render a prompt recurrence of the intussusception impossible. Too frequently a partial reduction only is accompanied by a disappearance of the tumor and alleviation of the symptoms, and when subsequent operation becomes necessary, the conditions are much less conducive to the ultimate recovery of the patient. Thus Lees and Silcock (9) report a case of a boy 4½ years old, in which the symptoms were relieved by rectal injection. Two days afterward they had recurred, and operation demonstrated an ileocæcal intussusception. Recovery followed a resection of seven inches of gangrenous gut and end-to-end suture. The use of these measures should therefore be strictly limited to the early hours of the intussusception, and should be practised then only in feeble subjects, where the operative risk is naturally great.

Another measure to overcome the obstruction without operation, that is indicated particularly in neglected cases of several days' duration, in which irreducibility, with or without beginning gangrene of the intussusceptum, has very likely taken place, is the passage of a Nelaton's soft rubber catheter upward through the protruding intussusceptum. This measure, naturally limited to those cases in which the intussusceptum protrudes from or can be reached in the cavity of the rectum, has not received the attention it deserves. Only one such case appears in the literature, namely, that reported by Ouvry (8), in an infant of 9½ months. There had been an acute onset, and the patient had become gradually worse, until, on the fourth day, the pulse was imperceptible and there was general distention. The intussusceptum was in the rectum. The catheter was introduced carefully, and on reaching a depth of from 8 to 10 cm., there was an escape of fœtid liquid material and gas. At a depth of 25 cm. the catheter reached the neck of the invagination. With its passage, gentle saline irrigation was combined. One hour afterward the child nursed, and the pulse became stronger and decreased to 120. At the thirty-sixth hour,

spontaneous reduction took place, and the infant recovered without operation.

Such a brilliant result could not always be expected, for the introduction of the catheter might frequently fail, and when successful, the obstruction might not be relieved nor subsequent spontaneous reduction take place. Even in Ouvry's case, in which, from his statement, the condition of the child was such as to promise little hope of success, yet, in the absence of all intervention, recovery might possibly have followed the later discharge of a sloughy intussusceptum through the rectum. Nevertheless, such success, even in only one case, seems to warrant a trial of this method, for it would require very little time, and would in no way either interfere with or delay subsequent operation.

In cases of early diagnosis, operation undoubtedly affords the best results. It is needless to emphasize the importance of operating at as early a stage as possible, for each hour of delay decreases the patient's powers of resistance and increases the difficulty of reduction, while the increasing distention unduly prolongs the operation, and may subject the patient to the shock of a partial or complete evisceration.

The operation is usually done under chloroform. The location of the incision seems to vary very considerably. A mid-incision either above or below, or both above and below, the umbilicus is advocated by some, while others prefer an incision along the outer border of the right rectus. The writer prefers the mid-incision both above and below the umbilicus, of sufficient length to admit the hand, for the reason that it not only permits a rapid diagnosis when the intussusception is near the splenic flexure (a diagnosis not easily made through an incision below the umbilicus only), but also for the reason that it facilitates, in all cases, every stage of reduction under the eye of the surgeon.

On opening the peritoneal cavity, the fluid is evacuated and search is made for the apex of the intussusceptum, to either side of which a pad is introduced, and while coils of intestine are held in place, the tumor is gradually delivered to the level of the abdominal incision. This search for the nature and location of the obstruction is facilitated by the presence of a mass, and by the fact that very frequently within the first twenty-four hours after the invasion the larger part of the small intestine is collapsed. Thus Barlow (10) mentions in two cases of the ileocæcal variety, and McGregor (11) in one case of the colic variety, a collapse of about one foot of the small intestine a short distance above the point of constriction (prior to reduction). In cases 3, 4, and 5, reported by the writer, this same condition was noted, although in the last two instances it was much more extensive, and involved the larger part of the small intestine. In explanation of its occurrence, the theory may be advanced that distention occurs with incipient paralysis of the intestinal muscle fiber, which, as long as it continues active, naturally expels the intestinal contents away from the point of obstruction.

Reduction of the intussusceptum is now accomplished by expression, the apex of the intussusceptum being constantly kept in view, as it is very gently compressed by the fingers of the surgeon toward the cæcum. The early part of reduction is almost always easily accomplished, and it is not, usually, until the cæcum itself is approached that any difficulty is experienced. At that stage, the writer does not agree with the opinion that expression should be still further continued without any assistance from traction of the intussusceptum. Expression too energetically applied is as certain to rupture the intestine as is excessive traction. While both extremes should be avoided, material assistance was afforded by gentle traction in cases 1, 3, and 4, here reported, without damage even to the peritoneal coat of the invaginated gut.

After reduction has been satisfactorily accomplished, some step should invariably be taken to prevent either immediate or remote recurrence of the invagination. The writer knows of at least one instance in which, in the absence of this precaution, rapid recurrence took place, with a fatal termination. That late recurrence is also possible is shown by the case reported by Power (12), of ileocæcal intussusception in an infant, where two operations were done, two months intervening, ultimate recovery taking place. In late recurrences, however, the second attack is not always of the same variety as the first. Thus McGregor

(11) reports a case in which the patient was operated on twice during the year for intussusception. The first attack proved to be an ileocæcal variety, while the second was enteric. The same writer reports a second case, in which, after an ileocæcal intussusception, the recurrence proved to be of the colic variety. It is not just, however, to maintain, that, in every case of intussusception, a recurrence can be averted by the exercise of any one of the different measures suggested for that purpose, although, at the same time, a search of the literature has failed to reveal any instance of recurrence under those circumstances. Inasmuch, however, as such a step does not materially lengthen the operation, it is advisable to carry out some measure that will render recurrence less liable, by limiting the freedom of mobility of the cæcum or of the small intestine.

McGregor suggests a reef in the mesentery and mesocolon, a measure which seems to incur the possible risk of interference with the circulation of the corresponding gut. Chiene (13), in a case of ileocæcal variety, sutured the mesentery of the terminal portion of the ileum to the wall of the cæcum in such a way that the end of the ileum made an acute angle with the vertical axis of the ascending colon. The writer, in cases 1, 2, 3, 4, and 5, merely sutured the gut both above and below the point of constriction to the anterior or lateral parietal peritoneum.

The removal of a Meckel's diverticulum in the enteric variety is always indicated, while an appendicectomy by some is also believed to diminish the chances of recurrence in the ileocæcal variety.

Before the closure of the wound a rapid search should be made for possible intussusception in other parts of either the large or small intestine, and if any are found, they must be treated in the same method as that just described. Ordinarily, after possible saline irrigation of the affected loop, the abdominal wall is closed without drainage. Of the writer's cases, 2, 3, 4, and 5, the histories of which follow, present the ordinary features of reducible intussusception.

CASE 2. Referred by Dr. Lee. J. N., male, aged 2 years and 10 months. Admitted to the Presbyterian Hospital, May, 1903. Child has always been strong, and free from all kinds of sickness. Thirty-six hours before admission, vomiting appeared, and has persisted since at increasing intervals, the vomitus consisting of the contents of the stomach, and afterwards of bile and mucus. During this same time there has been occasional discharges of small quantities of blood and mucus from the bowel. There has been increasing prostration and general abdominal pain.

Physical Examination. The abdomen is slightly distended; the child is strong and vigorous, and in good general condition. There is a sense of fullness in the lower right quadrant, with moderate rigidity and tenderness. In this same area there is dullness as far as the outer edge of the right rectus muscle. Peristaltic activity is far more active on the left than on the right side of the abdomen. On rectal examination no mass can be felt. Pulse ranges around 120; the temperature about 102°.

Immediate operation under chloroform anæsthesia. Median incision from one inch above the umbilicus to the symphysis pubis. The peritoneal cavity contained a large amount of clear serous fluid without odor. The small intestines were much distended and congested; the large intestine collapsed. An intussusception of the ileum about twelve inches above the ileocæcal valve was found, and reduced by expression. The gut was viable, and was sutured on either side of the line of constriction to the parietal peritoneum. Complete closure.

After the operation the vomiting entirely ceased; the bloody discharges per rectum disappeared. Fluid stool took place on the day following the operation. The pulse gradually diminished to 88 at the time of discharge. Primary union.

Three years after the operation. the patient is robust, and has never had a return of the intussusception.

CASE 3. J. K. C., male, aged 11 months. Admitted to the hospital October 4, 1905. The patient is a vigorous child, and had always been well until yesterday noon. At that time the patient doubled up as with severe abdominal pain, crying out, and shortly after had several attacks of vomiting, the vomitus consisting of the contents of the stomach. Towards evening the child seemed to strain, and passed small amounts of blood and mucus in the stool. These were repeated at intervals during the night. On the following day the vomiting was repeated, the bloody stools continued, and the child was evidently considerably prostrated and rapidly growing weaker.

On examination, the abdomen was prominent and slightly distended. An oblong curved tumor extending from the median line above the level of the umbilicus downward and to the left could be distinctly felt. It was sausage-shaped and moderately tender. There was no shifting dullness or fluid wave. On rectal examination the apex of the intussusceptum could be felt a short distance above the anus. Pulse was 135, temperature 102°, and respiration 36.

Immediate operation. Under ether anæsthesia, the peritoneal cavity was opened by an incision both above and below the umbilicus. It contained a small amount of serous odorless fluid. The mass forming the intus-

susception was easily recognized and brought into the wound, where it was reduced by expression, assisted at the end by slight traction. It was of the ileocæcal variety; after reduction, both the caput coli and the appendix were markedly congested. The cæcum and small intestine were sutured to the parietal peritoneum on the right side of the incision, and the abdomen completely closed without drainage.

Only one attack of vomiting occurred after the operation. The bloody stools ceased, but after the first day they were green, and offensive for a time. The temperature on the first day was 104°, on the second day it had dropped to 102°, and thereafter gradually decreased to normal. The pulse had diminished to 100 on the second day. The child nursed from the mother throughout the entire time.

Primary union was secured.

CASE 4. A. Q., female, aged 6 months, admitted to the hospital April 3, 1905. This morning, about ten, patient has an attack of convulsions. At eleven was seized with repeated vomiting, consisting of the contents of the stomach and afterwards of bile, and simultaneously with the vomiting the bowels moved a number of times, each movement containing blood and mucus. Patient refused all nourishment.

Physical Examination. There is some rigidity of the right side of the abdomen opposite the level of the umbilicus, with moderate tenderness and a sense of a mass. There is no distention and no evidence of fluid in the peritoneal cavity. Rectal examination was negative.

Operation eight hours after the invasion, under chloroform anæsthesia. Under the anæsthetic a sausage-shaped tumor was felt just to the right and slightly above the level of the umbilicus. The peritoneal cavity, opened through a three-inch median incision extending equally above and below the level of the umbilicus, contained but little fluid. Almost the entire length of the small intestine presented a collapsed appearance, except directly above the intussusception, where it was moderately distended. The apex of the intussusception was found in the descending colon, and reduction was easily effected by expression, aided by slight traction near the end of the maneuver. Suture of the cæcum to the parietal peritoneum. The intussusception was of the ileocæcal variety. Complete closure. Duration of the operation, 17 minutes.

There was no reaction or vomiting. The child took nourishment the following day without difficulty. On the third day after operation there were several dejections containing mucus and blood. Thereafter the stools were normal. Primary union was obtained throughout the entire incision.

CASE 5. H. M., male, aged 2. Admitted to the hospital April 3, 1905. Patient is a poor subject, having been treated in the dispensary of the Presbyterian Hospital for rachitis and general functional intestinal disturbances for the past eight months. For the past 48 hours patient has suffered from abdominal pain and from repeated attacks of vomiting, with occasional bloody stools. The general condition is poor.

Physical Examination. There is general abdominal distention and rigidity. Slightly to the left and above the level of the umbilicus a sausage-shaped mass could be felt, which, after the administration of the anæsthetic, became more distinct. On rectal examination the apex of the intussusceptum could be felt within the anal margin. Pulse 130.

Immediate operation, under chloroform anæsthesia. Median incision above and below the umbilicus. There was a slight amount of clear fluid in the peritoneal cavity. The mass forming the intussusception was brought up to the level of the abdominal incision and rather easily reduced by expression, the latter part only returning with some difficulty. The larger part of the small intestine was collapsed, the distention beginning about two feet above the site of constriction. After reduction had been accomplished, a general enlargement of the mesenteric glands were noticed, especially in that part corresponding to the lower part of the ileum. The small intestine and cæcum were stitched to the parietal peritoneum and the wound completely closed, the entire operation taking twenty minutes.

After the operation there was restlessness, with a gradual increase in the rapidity of both pulse and respiration. One dejection, streaked with blood, occurred two hours afterwards, but the general condition of the patient gradually became worse, and death took place in six hours.

No autopsy was permitted.

The element of irreducibility introduces a serious complication in the operative procedure. It is interesting to note that in some exaggerated cases, excision of the irreducible mass has been accomplished through the rectum. Thus Westbrook (14) cites a case in an infant six months old, where, after a week's duration, physical examination revealed the apex of an intussusceptum protruding through the rectum. This was removed by the cautery, and examination of the specimen showed it to consist of a "considerable part of the ileum and colon." "The patient convalesced, but died four weeks later, of gastroenteritis. No autopsy." Also, Petit (15) mentions a resection of sigmoidal intussusception, that was mistaken for a polyp, through the rectum. Grisel (16) states that, to his knowledge, only two cases of intussusception in infants treated by resection recovered. In one, that by Fisk, no mention could be found in the literature. The other, by Grosz, proved to be a case of resection of an intussusception through the rectum.

The method of removal of irreducible intussusception through the rectum can be practised in only exceptionally favorable cases of

the ileocæcal and colic varieties, but is necessarily excluded as a therapeutic measure in all enteric, ileocolic, and colic varieties in which the apex of the intussusceptum lies within the lumen of the gut. Under these circumstances (and many will think it true, as well, of all cases where the intussusceptum protrudes from the rectum) the condition of irreducibility can be treated satisfactorily only by laparotomy, the particular means of dealing with the pathological condition depending upon the question of viability of the inner and outer cylinders of the gut. If both are viable (and this, the writer believes, is a rare condition), Bell (17) recommends, theoretically, a division of the constriction as in paraphimosis. This permits of reduction, and leaves a linear incision of the gut, which can be quickly closed by the Czerny-Lembert method. Such a procedure would be useless in case of gangrene of either one or both cylinders, for, in each instance, it would unnecessarily increase the risk of a subsequent septic peritonitis.

Another operative procedure, suggested by Richardson (18), consists in making an enterostomy above the site of constriction. Enterostomy, however, seems to afford relief only in very few instances, and, owing to the excessive mortality associated with it, is scarcely to be advocated as a routine measure.

The group of cases in which the entire intussusception is gangrenous must be relieved by complete resection, it lying in the judgment of the surgeon to determine whether the divided ends are to be left in situ or whether an attempt shall be made to re-establish the continuity of the intestinal canal. In any event, the patient, if a child or an infant, rarely if ever survives. It must be remembered, however, that complete gangrene occurs only in extreme cases of constriction, and that the group of cases in which the outer cylinder is viable is much more common, although, unfortunately, the mortality after operation for its relief seems thus far to have been equally high. In an attempt to devise a method by which this extreme mortality could be lowered, the writer has thoroughly searched German, French, English, and American literature, together with references and abstracts of monographs in other foreign languages, and has found therein the following various methods of treatment:

1. Enterostomy. Made usually above the point of constriction, occasionally below that point, near the apex of the intussusceptum.

2. Resection.

(*a*) With artificial anus and subsequent restoration of the lumen of the canal.

(*b*) With immediate restoration of the lumen of the canal.

(*c*) By Barker's method.

(*d*) By Mikulicz's modification of Barker's method, consisting of the resection of the intussusceptum through an incision in the intussuscipiens, the edges of which have first been sutured to the edges of the parietal peritoneum so as to make an artificial anus. In this way infection of the general peritoneal cavity was avoided. Mikulicz (19) reported two cases treated in this way, of subacute or chronic intussusception in adults, both of which recovered. The writer has found no statement of the trial of this same method in acute cases in infants, and thinks that the length of time necessary to carry out the different steps of the operation in such tender patients might invalidate what certainly is a most ingenious procedure.

The excessively high mortality of any of these procedures (other than the untried method of Mikulicz) is clearly demonstrated by the following brief statements.

Rosenthal (20) has collected 25 cases of irreducible intussusception. In 12 cases, only 1 survived, an adult of 35, with chronic intussusception; of 9 enterostomies, all died.

Nelson (21) reports a case of enterostomy at the apex of a gangrenous irreducible intussusception, in a child of eight, the operation being done on the fifth day of the attack. Immediate improvement followed, with intermittent discharge of gangrenous intestine for eight days, through the enterostomy orifice. Then a recurrence of the obstructive symptoms took place, with distention and vomiting. A resection was then done, and was followed by the prompt death of the patient.

Cordica (22, *a*) has collected 23 cases of resection in infants and children, of whom 20 died and 3 recovered, the successful cases being 7, 9, and 11 years old, respectively. Of the 20

deaths, 11 were operated on since 1890. Of 19 cases of enterostomy in children, all died within 24 hours of the operation; of these, 11 were under 1 year, 4 were between 1 and 2, and the others were somewhat older.

Grisel (16) has collected 18 cases where an artificial anus was made, with 2 recoveries.

Cordica (22, *b*) reports a case of resection of a completely gangrenous intussusception of the lower part of the small intestine in a girl of four. The resected ends were left in the wound, and after several weeks, during which time the child was nourished with difficulty, an end-to-side anastomosis was performed, the ileum being implanted in the sigmoid, which had become shrunken to the size of a lead-pencil.

The writer has collected, including his own, fourteen additional cases of resection and three enterostomies. Of these, the majority were infants under one year, with only one recovery. This was a case reported by McDonnell (23), of the enteric variety, in an infant ten months old. On operation, fourteen hours after the onset, reduction was accomplished. There remained, however, a suspicious area of the small intestine, which was left exposed, and which, at the end of the eighteenth hour, had proved gangrenous. Three inches of the intestine were then resected, followed by end-to-end anastomosis by suture, with a glass drain for twenty-four hours, the patient making an uneventful recovery. This was not, however, either an irreducible case or one of the ileocæcal variety; two most important factors, for, owing to the first, the intussuception had been of comparatively short duration, and therefore the powers of the patient had not become entirely exhausted, and, owing to the second, the restoration of the continuity of the intestine was facilitated by the fact that the resected ends were of the same caliber. Nevertheless, it was the only case of recovery which the writer was able to find in an infant under one year.

In older children, on the other hand, recovery has taken place, although infrequently, and, as in the case of the infant just cited, the intussusceptions have always been of the enteric variety. Of these, Dowd's case (24), in a child of four years and four months, deserves mention, and is of interest because of the comparatively long time intervening (ten days) between the invasion and the operation. The ends of the intestine were brought together by circular enterorraphy and the abdomen was closed without drainage.

Barlow (25) reports a case, in a child of ten, of four days' standing, of enteric intussusception, in which, at the time of operation, a purulent exudate into the peritoneal cavity was found. Here, after resection, the ends were united by a Murphy button in an end-to-end anastomosis, and after flushing the peritoneal cavity with saline solution, a glass tube was introduced and the wound closed. Recovery was impeded only by a stitch abscess. Cordica's case, in a patient of four, has already been mentioned.

Of the fatal cases published during the last few years, the resected ends have been united by the end-to-end method, with both suture and button, by lateral anastomosis after closure of both ends, and by the end-to-side method after closure of the distal end. As yet, no successful case has been published of resection for an ileocæcal intussusception in an infant under one year in which the continuity of the gut has been re-established, and only a single case of the enteric variety where the patient was not yet a year old. That some similar measure must be followed in cases where the entire intussusception in gangrenous, is undisputed. The operation should be conducted as quickly as possible, and the continuity of the intestine should be restored by rapid suture. Even under the most skillful manipulation, recovery will always be a rare occurrence. When only the intussusceptum is gangrenous, however, cannot better results be achieved than by resection? In a small proportion of these cases, nature, unassisted, effects a cure by the separation and ultimate discharge of the intussusceptum through the rectum. Is it not possible for the surgeon to assist this process, and to facilitate the separation and discharge of the necrotic material, while at the same time means are provided for the relief of the obstruction? Barker, some years ago, reported a series of cases, in which a resection of the intussusceptum was attempted through a linear incision in the intussuscipiens. This,

however, is very difficult to accomplish without soiling the peritoneal cavity, and the intraintestinal ligation of the mesentery is fraught with a very considerable risk of hemorrhage. In fact, not a single recovery is cited in cases treated by Barker in this way. The method of the late Mikulicz has already been mentioned and has the advantage of avoiding the risk of peritoneal contamination. Although two successful cases by the author of this method are reported in adults, no case similarly treated in an infant has as yet, to the writer's knowledge, been published. In fact, it is questionable whether the relatively longer time necessary for this form of operation, together with the uncertainty of satisfactorily ligating the friable if not gangrenous mesentery, might not make it of less value in acute intussusception of infants than in the chronic intussusception of adults.

The following plan occurred to the writer in connection with case 6, and although the method, as suggested, is as yet untried, yet the very high mortality of resection seems to be a sufficient excuse for offering it as a substitute at this time.

After opening the abdominal cavity, the intussusception is identified, and reduced, as far as possible, without the use of either excessive or unduly prolonged effort of expression or traction. The small intestine is then sutured at its point of entrance to the margin of the intussuscipiens by several interrupted silk sutures extending through the serous and muscular coats. These sutures insure the formation of sufficient adhesions between the viable part of the bowel to prevent extravasation of intestinal compounds, when nature subsequently separates the sloughing intussusceptum from the adjacent viable gut. The entire intussusception is now returned into the abdominal cavity, with the sole exception of that portion corresponding to the apex of the intussusceptum. At this point, suitably protected by pads and held up by a pair of silk ligatures, the intussuscipiens is opened longitudinally, exposing the apex of the intussusceptum. A soft rubber or silk catheter is then passed, if possible, through the intussusceptum, beyond the constriction, into the bowel above, the escape of the accumulated fæcal material and gas being prevented temporarily, until the edges of the divided intussuscipiens and the parietal peritoneum are untied, by placing a clamp on the catheter. In this way the obstruction may be relieved until the patency of the intestine is again restored by the discharge of the intussusceptum either through the opening in the intussuscipiens or through the rectum. That the passage of the catheter in the manner described is feasible was demonstrated in the autopsy of case 6, where it passed without difficulty beyond the constriction, as well as in the case of Ouvry and in a similar case that was recently observed by the writer in the living subject. If the passage of the catheter is unsuccessful, an enterosotomy made in the manner described would facilitate the ultimate discharge of the sloughy intussusceptum.

In conclusion, the serious character of all neglected cases of intussusception cannot be too strongly emphasized, as well as the fact that any method of treatment is likely to be unattended with success. Hence the surest relief is afforded by early and prompt operation while the intussusception is still in a reducible condition and while the resistance of the patient is sufficient to withstand successfully the shock of a laparotomy.

CASE 6. F. C., male, aged 7 months. Admitted to the hospital November 4, 1904. Three days ago, the infant, who had always been perfectly healthy, was thought to be sick, because it cried a good deal. Two days ago, the bowels moved for the last time, although cathartics were given since. For the past thirty-six hours there has been persistent vomiting, which, at the time of admission, had a fæcal odor. During this same time, there have been occasional discharges of blood and mucus from the rectum. The general condition of the patient is very poor, and the pulse is 140 and feeble.

Physical Examination. The entire abdomen is slightly distended and moderately rigid. There is general tympany, and no evidence of shifting dullness. No tumor could be felt. There is a moderate amount of visible peristalsis. Rectal examination was negative, an enema failing to bring away either gas or fæcal material.

Immediate operation, under chloroform anæsthesia. Median incision from umbilicus down to the symphysis pubis. The peritoneal cavity contained turbid free serous fluid. After partial evisceration, the apex of an intussusception was found at the splenic flexure, and was partially reduced by expression until the tip of the vermiform appendix became visible. All further

efforts at reduction were fruitless, however, and an opening was made in the distended small intestine just above the point of constriction and stitched to the edge of the divided peritoneum. Partial closure.

The patient died six hours after the operation, from shock, the enterostomy having discharged a considerable amount of fæcal material.

Autopsy. The intussusceptum was gangrenous, and could be reduced only after the division of the intussuscipiens for a distance of several inches on either side of the constriction. Before this was done, however, a soft rubber catheter was easily passed through the apex of the intussusceptum into the small intestine above the point of constriction.

CASE 7. J. J., male, 9 months old, July 5, 1900. Child was fed on breast alone for five months, then on breast and bottle for six weeks, then by bottle alone up to the present time, the food consisting of a dram of cereal to a pint of boiled milk. For the past six days the child has been restless and sleepless, and inclined to vomiting after taking nourishment. Three days ago, blood was noticed for the first time in the stool, there being a bloody discharge once an hour for eight hours, then at longer intervals up to the present time. There has never been any mucus, but the bloody stools have been mixed with considerable foul material, and with "lumps looking like raw meat." The vomiting has increased in frequency for the past thirty-six hours, and to-day acquired a fæcal odor.

Physical Examination on Admission. The child looks sick. Extremities cold. Heart rapid, but regular. The abdomen is generally distended. There is general rigidity, which is more marked in the left lower quadrant, where a distinct oval mass the size of a lemon may be felt extending down toward the pelvis. The apex of the intussusceptum can be felt per rectum two inches above the anus. Small amount of blood on the examining finger.

Immediate operation. Chloroform. The peritoneal cavity was opened through a vertical incision four inches in length, below the level of the umbilicus, just to the left of the median line. After partial evisceration, the small intestine being greatly distended and cyanotic, and held with difficulty in the abdominal cavity, the intussusception was reduced by expression through the large intestine to a point about ten inches above the ileocæcal valve. At this point four inches of the small intestine were gangrenous, and perforation had already occurred. Resection of eight inches of small intestine, with end-to-end suture by means of Murphy button. Closure with gauze drain.

Child died four hours after operation, not having recovered from the shock.

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CANCER OF THE SIGMOID AND RECTUM[1]

By C. H. MAYO, A. M., M. D.
Surgeon to St. Mary's Hospital, Rochester, Minnesota

WITH some modifications, the curability of cancer is generally accepted. To obtain the best results, it is essential: 1. That the disease be situated in tissue or in organs that can be removed without causing death; 2. That the disease be confined to the structure of its origin and the immediate lymph-nodes tributary to it. These conditions may be, to a great extent, changed by the type of the cancer and the age of the patient, cancer being, relatively, more rapidly disseminated in the young with their active lymphatics than in the aged with their natural vessel changes.

In considering cancer of the rectum and sigmoid, we find that three men are thus affected to one woman. With regard to the frequency, Herman's collection from the Prussian hospitals shows that, approximately, one half of all cancers affect the alimentary tract, and one sixth of these are in the large bowel. Ewald's collection of over eleven hundred cases gives their location as about nine in the rectum to two in the rest of the colon.

Cancer extends by continuity of tissue and through the lymph-nodes, rarely by veins, especially portal, causing liver-nodes and grafting on peritoneum. It may be said of the disease in general that the secondary or metastatic growths are the usual cause of death where tubular structures are not involved. It is now known that Nothnagel's estimate of the duration of life with cancer of the bowel, which he gave as from six to twenty-four months, is very often exceeded. Infection in some organs or regions rich in lymphatics, like the lung, neck, or axillary, early involves the glands, but the colon, with a reduced lymph-supply, brought about through ages of resistance to bacterial life, of which it is a natural harborer, often holds malignancy for a long time as a purely local disease.

The large bowel is the drier of the fluids delivered from the small intestine, where the bulk of the proteids are extracted. It is probable that Metchnohoff is too radical in his views concerning its elimination, overlooking its value as an absorber of water.

The lymph drainage of the anal portion of the bowel passes to the inguinal glands, while that of the lower rectal passes laterally in the region of the middle hemorrhoidal vessels. A few lymph-channels are tributary to the pudic glands, while the greater portion gather above the levator ani muscle and pass up the midline with superior hemorrhoidal vessels to the prominence of the sacrum.

Hausman, in 112 collected autopsies of those dying of cancer of the bowel, found that 55 were limited to the bowel; of the remainder, but 36 involved the lymphatics, and 21 cases showed general infection. Such conditions would be expected to occur above the rectum, from the lymphatic condition.

Treves, in his report of 100 cases of stricture of the bowel, found 70 in the descending colon and sigmoid, 58 being in the latter situation.

We have, then, a disease in a removable structure which is slow to disseminate infection, and yet, approximately, only one half of the cases are discovered at an operable period, as far as curability is concerned, being usually called external or internal piles if low. This is due to the lack of marked symptoms in the early period, to the carelessness of the patient, and often to the failure of the physician to examine, although he prescribes.

There is more excuse for delay in those cases occurring above the rectum; and here we must consider that attacks of obstruction of the large bowel occurring without inflammation in those beyond middle life are indicative of stricture, which is probably cancerous. Early symptoms of cancer may be relatively trivial, as diarrhœa, or alternating diarrhœa and constipation, passages of mucus and blood, and the presence of piles.

The usual type of malignancy here is ade-

[1] Read before the American Surgical Association, Cleveland, Ohio, May 31, 1906.

noma carcinoma. It begins in the mucous membrane, and later invades the muscular and peritoneal tissues. According to Ball, tumors felt outside the rectal wall, and not attached to the mucous membrane, are not cancer; tumors of the mucous membrane not attached to the muscular coat are adenomatous, and not as yet distinctly malignant.

In the most of cancer work there has been too little attention paid to the character of the cancer in basing the prognosis. This subject has received particular attention in the report of the surgical clinic at Heidelberg by Peterson and Colmers. They found that microscopically solid carcinomas return in every instance. The carcinoma adenomata they divided into simplex, papilliform, microcysticum and gelitonosa. The colloid form gave one hundred per cent of recurrence, the simple adenoma carcinoma had an exceptional cure, while the microcystic and papilliferous remained well. All mixed forms, like the polyoid, recurred, the superficial ulcers usually being carcinomata adenomata, the simplex giving an occasional cure, while the deep circular ulcers with nodes have a poor prognosis from early dissemination.

When cancer involves the sigmoid, a large majority of cases will require an exploratory incision to determine the exact nature of the affection as well as its location. If cancer, the question as once will arise as to whether or not it is possible to extirpate the growth. The removal will be decided by the extent of the invasion of the lymphatics, adjacent structures, or liver, also the age and general condition of the patient.

When possible, the diseased area is removed and some form of immediate anastomosis performed, usually suture, either with or without colostomy, which may often be necessary to relieve temporarily the oftentimes enormously distended and impacted condition of the intestines above the disease. It frequently becomes necessary, immediately after opening the abdomen, to relieve the gas or fluid distention by puncture of the bowel with a trocar.

In removal of sections of the colon, we can place considerable dependence upon the integrity of the blood-supply, which resembles, in this respect, the tolerance of the stomach, so that suture anastomosis is made in an increasing number of instances. Where it cannot for various reasons be employed, and it is desired to obtain the temporary advantage of a colostomy with a later closure of this opening, it is accomplished in the following manner. (Mikulicz.) The open ends of the bowel are sutured together for two thirds of their circumference, exactly like an end-to-end anastomosis, the opposing sides of the bowel being also sutured together for four or five inches. A small abdominal opening is now made at a favorable point, and the bowel union drawn into this incision and secured by sutures, the larger abdominal incision being closed. A couple of weeks later a pair of large forceps are passed into the artificial anus, one blade into each portion of the bowel, and clamped together. The clamps are tightened each day for four or five days until they cut their way through and re-establish the lumen of the proximal and distal portions of the bowel. There is no danger of clamping the small intestine; the large bowel having been sutured laterally prevents their passing between the clamped portion of the bowel. The external fistulæ can be closed at any time, thus practically making an intra-abdominal intestinal anastomosis without an incision. We have employed this method four times with a perfect result. The same result can be obtained by joining the distal end to the side of the proximal bowel, the end of the latter being brought out of the abdomen for a temporary safety colostomy.

In case the tumor is not removable, the diseased area can be short-circuited by uniting the bowel above and below the obstruction. If the bowel is empty, suture anastomosis is employed, or the McGraw ligature. Especially is the latter useful in cases with an excess of free peritoneal fluid and where the tumor is not removable, although extensive operation in such cases is a questionable procedure in most instances, as the reparative powers of the peritoneum are so reduced. The anus is thoroughly dilated at the close of all methods of operation, and a gas-tube inserted into the rectum.

Certain definite results are desired in operations upon cancer of the rectum; namely, permanent cure, low operative mortality, and a controllable anus or its best substitute. Cancers

of the rectum can be clinically divided into two main groups: 1. Those within easy reach of the finger, not exceeding from two to two and a half inches in distance from the anus; and 2. That larger group which lies above the levator ani muscle and can be reached digitally with more or less difficulty.

The first group can be disposed of in a few words. The lower end of the rectum, with the growth, can be dissected out through the perineum, aided by an incision backward, and removal of the coccyx, if necessary. This incision is usually sufficient, but may be extended by continuing it upward along the side of the sacrum until ample space is secured. Occasionally an operation started in from the perineum develops unsuspected glandular metastasis at a higher level, justifying a Kraske operation, the fourth and fifth sarcal vertebræ being removed to give additional room.

In the female, this anterior route may be chosen instead, and by a free incision through the posterior wall of the vagina, operating space may be obtained. (Murphy, Byford.) In either method the hemorrhage may be readily controlled, as it is almost entirely from small branches of the internal pudic and coccygeal arteries and from the inferior hemorrhoidal plexus

The results of operation for low rectal cancer are essentially unsatisfactory, particularly in the male, on account of the urethra, prostate, and neck of the bladder. As the entire muscular apparatus of the rectum is removed, control is not to be expected. Therefore extensive dissections for the purpose of drawing the rectum down to the anal margin are not of great value.

The skin around the anus can often be mobilized sufficiently to reach up to the rectal stump. This can be facilitated by lateral incisions and by undermining the skin, securing in this way two flaps attached at each end, which can be slid up into the space.

Surprising to relate, many patients retain very fair control, as the sigmoid, which is the natural fæcal container, has not been interfered with, and unless the stool is loose, involuntary escape may not be sufficiently frequent to be a source of great discomfort.

In some individuals the rectum will retract, leaving a considerable extent of scar tissue. This is funnel-shaped toward the outer side, and usually does not give rise to annoying stricture. Occasional wearing of a rectal plug overnight produces the required patency.

If the prostate is involved to any extent, more extensive operations are needed, and as the region can be better seen by the posterior incision or Kraske operation, this route, in cancers which lie two inches above and yet entirely within reach of the finger, is the most satisfactory, although it will be necessary to open up the peritoneal cavity and loosen the bowel until the upper fragment can be approximated to the anal margin.

We believe the foregoing covers the clinical usefulness of the lower posterior operation. The mortality is from five to ten per cent, and permanent cures are to be expected only after early operations. Unfortunately, the disease is usually supposed to be piles until too late for cure. We have had a very few satisfactory results, but the majority had a speedy return.

The second group is by far the larger, comprising as it does all of those cases which lie above *easy* reach (2 to 2½ inches) of the examining finger.

In the case of the lower route, the arguments in favor of some form of posterior or Kraske operation for high rectal cancer are numerous. It brings the operator down at once upon the region of disease. If the lower end of the rectum, including the levator ani muscle, as well as the internal and external sphincters, is not involved, the upper fragment, by loosening the lower sigmoid, can be drawn down and directly sutured to the distal end; or if only the external sphincter is saved, after excision of the mucous membrane the upper fragment can be drawn down and united to the anal verge.

The disadvantages of this method are many. The operation is a bloody one, much of the hemorrhage being difficult to control except by hot gauze packing. Inspection of the operating field is not ample and clear, especially at the upper part. In particular, one cannot make that high removal of lymphatic glands and possibly infected fat which we have learned is the most important safeguard against metastasis.

As a matter of experience, it is shown that

a direct end-to-end union is by no means a satisfactory procedure, even providing it can be done. The lower fragment, having no peritoneum, does not unite readily, and the upper end, being invested with peritoneum only on its anterior and outer aspects, does not furnish sufficient of this structure to safeguard plastic union. It is true that the peritoneum can sometimes be loosened and sutured around the upper portion, giving it a complete peritoneal investment. But the rule is, that union is not complete, and small but intractable fistula at some point results. Generally the muscular apparatus of the rectum is necessarily so badly damaged in the removal of the disease that even if the bowel can be drawn down to the anal margin, muscular control will be incomplete and unsatisfactory.

The operation for hemorrhoids known as the American (Whitehead), a simple procedure as compared with this, frequently causes either stricture or incontinence.

In many cases the bowel cannot be drawn down, necessitating a sacral anus, which is exceedingly unfortunate, as the situation is one which is inaccessible to the patient, rendering cleanliness difficult. If it is necessary to pull the bowel down to any great extent, the sigmoid loop as a fæcal container is destroyed, and frequent and uncontrollable stools the rule.

The operator may hesitate to remove resolutely, regardless of consequences, all of the tissues which may be infected, but which lie outside of the directly involved area, as he has in mind continually the desirability of giving future continuity of function. Lastly, the surgeon is unable to judge of the limits of the disease above until the operation is nearly completed, and many a victim of cancer of the rectum is subjected to an unavailing and mutilating procedure which would not have been undertaken could the operator have known beforehand of the extent of involvement.

Attempts to obviate some of the disadvantages of the sacral operation have been made, especially as to securing a larger field by osteoplastic resections. The best of this class is the one in which a quadrangular flap, with its base at the anus, is made by lateral incisions extending up to the fourth sacral vertebra, the fourth and fifth sacral vertebra being separated from the sacrum with a chisel and the trap-door turned downward.

Osteoplastic resections interfere with free drainage, and removal of the bone is not difficult, nor does its retention add anything to function.

The mortality after the sacral operation has been considerable, largely due to infection, on account of the difficulty of securing and maintaining freedom from fæcal contaminations.

We have followed the advice of Hochenegg in carefully clearing out the bowels two days in advance of the operation, and allowing at least twenty-four hours to elapse for the stools to become formed before operating.

In order to avoid infection from the common source, it has been the custom of some surgeons to do a preliminary colostomy for the purpose of diverting the fæcal current, to be followed by the radical operation after an interval of from ten to fourteen days. This abdominal incision can also be utilized for the purpose of exploring the upper limits of the growth and the glandular involvement before making the fixation of the sigmoid.

The disadvantage lies in the fact that if the mesentery of the sigmoid is short, attachment to the abdominal wall may entirely prevent drawing the bowel down to fill the gap left by the resection, and the abdominal section must be unnecessarily large, as an exploration is inadequate without the introduction of the entire hand into the peritoneal cavity.

Permanent colostomy without removal of the growth has not sustained its reputation of ten years ago. It has few advocates, unless actual obstruction is imminent. As McBurney points out, obstruction from a low growth, unless of the annular variety, is better treated by curettement than by colostomy, and especially cauliflower growths, which seldom redevelop in such a way as to interfere seriously with the fæcal current after thorough scraping out.

It must never be forgotten that after colostomy the period of disability has commenced, and as cancer of the rectum is often a slow disease, every effort should be made to delay the time of "waiting for death."

What results may be expected from the sacral operation? Hartwell, in a series of forty-six cases by sixteen New York surgeons, showed

a mortality of twenty-six per cent, and only sixteen per cent living beyond the three-year limit; certainly, a poor showing when one considers the disability which attends upon the majority of those who do not die from the immediate effects of the operation. Our results after this operation have been about as Hartwell reports.

Quenu, in 1897, recommended a combined abdominal and perineal attack upon rectal cancer, and the operation which he advocated, modified to a greater or less extent, has had an increasing number of advocates, notably R. F. Weir, Robert Abby, and Tuttle in this country.

In common with the majority of surgeons, we have become dissatisfied with the sacral route, excepting in selected cases, and for five years have practised a modified Quenu operation upon patients who would consent to it. For sentimental reasons a large number of individuals elect the posterior operation even after careful explanation.

The Operation of Choice for High Rectal Cancer. Bearing in mind that the lymphatics of the lower rectum first pass laterally with the middle hemorrhoidal vessels and then converge posteriorly in the mesorectum with the superior rectal artery, it is evident that any operation, to be effective, must remove the entire chain of glands with all the fat as high as the promontory of the sacrum.

The method of procedure is as follows: The patient is placed in the high Trendelenburg position and the abdomen freely opened in the middle line. The upper limits of the growth and its relation to the surrounding tissues noted. The possibility of the removal of all of the obviously infected glands is ascertained, and the liver examined for embolic carcinoma. If the case is a favorable one, the intestines, with the exception of the sigmoid, are carefully packed away with large gauze pads; two clamps are caught across the lower sigmoid on a level with the promontory of the sacrum and the bowel divided between. The mesosigmoid is liberated by lateral incisions and the proximal fragment brought up outside of the abdominal wound. A ligature is thrown around the bowel immediately below the forceps, which are removed as the ligature is drawn tight. A purse-string suture is placed an inch below the end of the stump, which is invaginated in a manner similar to that of the appendix. The ends of the ligature are left long. The threads and stump are carefully cleansed. The distal stump is treated by inversion in a similar manner, to prevent soiling. Lateral and anterior peritoneal incisions are now made, liberating the rectum from the bladder and prostate in the male and from the uterus in the female. The inferior mesenteric artery, which is the upper continuation of the superior rectal, is caught and tied above and to the left of the promontory of the sacrum at as high a point as can be safely done without interfering with the nutrition of the bowel used in the colostomy. The fat is carefully separated, the entire mass of gland-bearing fascia, with the fat, is wiped perfectly clean to the periosteum. The middle sacral artery is of considerable size in most cases, and should be caught and ligated near its origin from the abdominal aorta between the common iliac vessels. The dissection is continued downward, exposing the internal iliac vessels and the ureters. Most of this can be done by sponging. The middle hemorrhoidal vessels are caught laterally, as they come off with the inferior. The entire area is now packed with hot moist gauze, and the patient put in the perineal position. In some cases, if the bowel is healthy for a space of four inches above the anus, it is clamped and ligated at this point, and cut above the ligatures, the diseased area being removed. The operator, or preferably a second operator, begins the lower part. A pair of forceps are passed into the blind pocket of bowel from below, the tied end of the bowel is pushed into the open forceps, and they are withdrawn through the anus, inverting the bowel.

After cleansing, the thread of closure is cut, and the forceps are now passed through the invaginated bowel and anus into the pelvis to grasp the proximal end of bowel, which is withdrawn, and the two ends united by a circular end-to-end closure outside the anus and allowed to retract. Drainage is secured by a midline incision in front of the coccyx, through which tube drainage into the pelvis is made. This type of operation (Mansill) we were able to make in four cases. In some colostomies, the

lower end of the rectum can be saved as a blind pouch, or temporarily employed for drainage of the pelvis. Should the disease require such extensive removal of the rectum as to destroy the lower rectal wall muscles and nerves, as well as straighten the sigmoid loop, thereby losing both retention and control, it is preferable to save the sigmoid loop as such and make an abdominal anus. To employ this method, a small gridiron incision is made on the left side, as would be done on the opposite side for appendicitis, and through this opening, using the ends of the threads as a tractor, the proximal stump is pulled out three fourths of an inch beyond the skin surface. Three or four linen sutures are quickly placed, uniting the bowel to the peritoneum on the inner side, and a silkworm-gut suture on the outside closes each angle of the wound, including in its bite the skin, aponeurosis of the external oblique, and the wall of the bowel, holding it securely in position. If this plan is followed, the operator from below, after inserting the gauze in the rectum to facilitate subsequent dissection, and closing the anus by a circular suture, circumscribes the anal margin with a deep incision, and dissects the perineal portion of the rectum with its muscles and fat free from the prostate and urethra, or from the vagina in women. This extends up to the levator ani muscle, which forms the boundary between the upper and lower dissections. The abdominal operator now passes down the fragment of lower sigmoid and the upper end of the rectum with its fat and glands into the perineal opening, where they are removed by the surgeon working below, or one operator, with changes of gloves, can accomplish the work in both fields. All bleeding-points are caught and ligated. A considerable sized gauze drain is passed from above downward, leaving its upper end just exposed on a level with the peritoneum, which is drawn together to cover as much as possible, the external gauze portion being brought out of the perineal wound. The sigmoid loop from above is placed over the exposed surface, and in the female the body of the uterus and broad ligaments are adjusted with a few sutures to aid in covering. The upper incision is completely closed, while the perineal opening is narrowed to proper dimensions for drainage by a few sutures.

The end of the sigmoid is left completely obstructed for the first twenty-four hours, after which time the circular suture is cut and the stump everted by the ligature, which is tied around it, and the bowel opened.

The advantages of the operation herein outlined are obvious. The disease is removed widely, with all of its tributary lymphatics, muscles, and related tissues. The anus is placed in a position easy of inspection and cleansing; the sigmoid trap obviates the necessity of frequent stools, and the intermuscular incision gives a fair degree of control.

What may be expected from this combined operation?

In five years, W. J. Mayo and I, usually working together, have operated upon 26 patients, of whom 7 died as a result of the operation or within the first month. Of the 19 who recovered, 2 were not traced, but were known to be alive and well more than one year.

10 cases operated upon too recently to be of value, alive and well now.

1 operated upon a year ago died before the end of the year. This is the only one of those operated upon more than a year ago, and who survived the operation, who failed to live one year.

7 lived over one year; 5 alive now.

5 lived over two years; 3 alive now.

3 lived over three years; 2 alive now.

As there were only 4 of those operated upon more than 3 years ago who survived the operation, and 2 are alive and well, we have 50 per cent alive and well over 3 years—too few from which to draw conclusions, but suggestive.

PRESIDENT'S ADDRESS BEFORE THE AMERICAN SURGICAL ASSOCIATION[1]

Report of a Series of Cases of Malignant Growths, with a Clinical Study of the Possibilities of Carcinoma and Sarcoma Appearing in the Same Patient

By ALBERT VANDER VEER, M. D., Albany, New York

THERE is much in the organization we represent that I would like to review. Well do I call to mind the thoughts and views the elder Gross held when considering the possibility of organizing the American Surgical Association. Could he have realized how great was to be his reward in the excellent work accomplished in less than a quarter of a century, what comfort would have been his. At Atlanta, at the Isles of Shoals, at other vacation resorts, in conversation, this is the association that he prophesied would, in time, represent the surgery of this country.

For me to review historically all that has been accomplished, and of which I have been personally cognizant, would indeed be "bringing coals to Newcastle." Some of you, in most forceful reviews, have covered the ground; others have had the advantage of reading these admirable addresses, and the education of the younger men has been augmented by access to our priceless volumes.

Of the impressive periods, and of the greatest value, I would recall two meetings, one of which early recognized the importance of bacteriological work, with the establishing of laboratories for research and pathological investigation; the other, where the able and careful discussion of the question of exploratory laparotomy resulted in its indorsement and recommendation. Never will I forget this scene, when gray-haired surgeons were willing, under proper surgical technique, to open freely the peritoneal cavity, and gave their consent to the performance of operations they had hitherto believed too hazardous, and in fact impossible.

In this atmosphere of my professional retrospective buoyancy, permit me to express to you my gratitude for your confidence in electing me your presiding officer.

Deeming it not out of place, let me congratulate you upon the final disposition of the question of membership in such a manner as to retain all the loyalty and attendance of the senior fellows, and allow the election of a fair number of vigorous young and middle-aged men.

Also, I would most earnestly call your attention to the geographical distribution of the fellows elected in the past. In the United States are fifty cities ranging from 50,000 up to 321,000 inhabitants, also, there are several cities in Canada having a like census, that have no representation in our association. It is fair to assume, and in fact we know, that a great majority of these cities contain good hospitals, and in some instances a well-organized medical college. In the advancement, as senior fellows, and in the addition of a larger number of new men, ought we not to consider somewhat more carefully geographical claims, other conditions being equal? There are certainly many able surgeons in this unrecognized territory who could add much regarding racial and climatic influences upon general surgery, hitherto somewhat neglected. In presenting these views I would in no way lessen the value of the work done by brave, well-prepared men in smaller towns. We know full well that some of our ablest fellows are from the latter places, and in recognition of their great success they, in return, have added immensely to the worth and prominence of the association.

For many years I have had in mind the possibility of the duality of malignant disease, that is, as to carcinoma and sarcoma presenting in the same patient, and as to the genesis of many cases appearing in the same family.

With these thoughts in mind I wish to present

[1] Read before the American Surgical Association, Cleveland, Ohio, May 30 to June 1, 1906.

the following observations. To this subject I was first attracted by the case of Mrs. P. R., aged 57, who presented March 20, 1870, with acute carcinoma of the left breast, and who, while being prepared for operation, was suddenly seized with a convulsion, ending in immediate death. An autopsy revealed a tumor from the dura, extending outward, ulcerating nearly through the cranium, which caused deep pressure upon the brain substance. (Fig. 1. At autopsy.) No other growths were found in the brain, and, aside from the left breast, all other organs were in a healthy condition. A microscopical examination made of the brain tumor at the time, together with the macroscopical appearances, classed it as a sarcoma. The microscopical examination of the tumor from the breast was positively that of acute scirrhus or carcinoma.

Years passed by, and though many cases were observed giving all the phases of malignant growths, yet no picture presented itself like that carried in my mind of carcinoma and sarcoma appearing in the same individual.

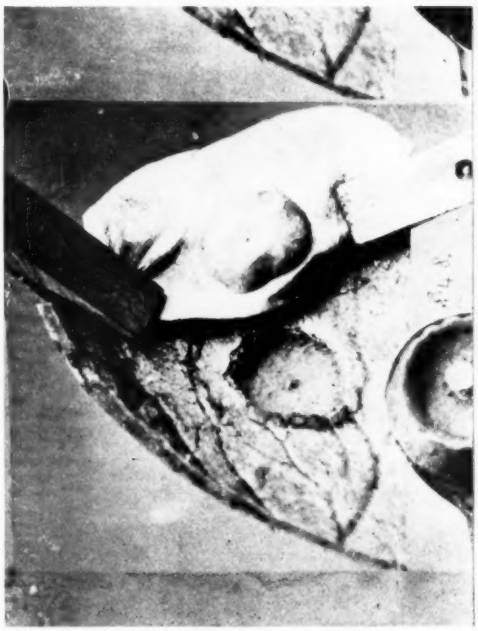

Fig. 1. Mrs. P. R. Age 57. Acute carcinoma of left breast. Sarcoma of dura mater.

In May, 1880, I was called to see Miss C. J., aged 50. She had passed her menopause without any complications, but for nearly two years had noticed a growth in her left breast, which she had shown to no one until now, when the ulcerative odor had attracted attention, and on examination by her physician, he found a carcinoma far advanced. There were large masses in the axilla and in the supra and infra clavicular spaces. No operation was possible, the patient dying June 10, 1880, from sepsis. There was no autopsy.

Her family history was of interest. Her father, aged 73, had recently died from an extensive and long-standing epithelioma of the lip and face, which had involved the glands of the neck. He had never permitted treatment of any kind or in any form. Mr. J. had previously lost a brother at the age of 56 years, with some form of malignant disease of the foot, who had been ill for a long time. Otherwise Miss J.'s family history seemed excellent. Her mother, aged 70, was in good health, and gave a good family history, but died later from some kidney complication.

Some time after the death of the first and eldest sister, I was called to see the second sister, Miss D. J., aged 53, with a good personal history, and who, a few months previously, had noticed a tumor in her left breast. On examination it was plainly a case of movable, acute carcinoma, without axillary complications. An immediate operation was advised and agreed to. The operation was very thorough, extending far up in the axilla, but not removing the pectoral muscle. She remained well for about fifteen months, when a few nodules appeared in the cicatrix, which ulcerated, giving her little annoyance, but within a short time, September 9, 1886, she died from metastases of the liver and stomach. No autopsy was held. Examination of the tumor removed classed it as a case of acute scirrhus. The lessening of her sufferings, as compared with her sister's case, made a very profound impression upon her family and friends.

In May, 1899, I saw Mrs. E. J., aged 50, a fourth sister, in age, married, mother of one child, whom, at birth, she had nursed for a few months without any mammary complications. Several weeks previous to my visit she had noticed a tumor in left breast, associated with sharp, lancinating pains, retraction of the nipple, and all the symptoms which she had observed in her sisters' cases. She was greatly disturbed, but, with her husband, readily agreed to a prompt operation, which I made equally as thorough as in the last case, doing it at the home of the patient.

She remained well until January, 1903, when I was again summoned to see her, as she had, a few days previously, called her physician's attention to marked abdominal pain. Upon examination it was very evident she was suffering from an ovarian cyst. She entered the Albany Hospital at once, and at operation a multilocular cyst was found connected with the left ovary. Pathological examination of the tumor removed demonstrated it an ovarian cyst with secondary papil

lomatous and carcinomatous degeneration. Right ovary and appendix normal.

Following this operation, Mrs. J. gained greatly in health and flesh and made an European trip.

In May, 1904, I was again called to see her. Two weeks previously she had begun to suffer with severe abdominal pain, abdomen tender to touch, and some slight nausea. She entered the Albany Hospital January 25, 1904, and after preparation I operated on the morning of the 26th. Incision revealed a large cyst connected with the right ovary. This was aspirated, but cyst-wall was found so thoroughly adherent to the surrounding tissues, including appendix, head of cæcum, and small intestines, that it was found impossible to remove it entirely. The greater portion was excised, and laboratory examination revealed the same general characteristics as the previous tumor of the left ovary.

She was discharged from the hospital February 19, 1904, and improved after this, being quite comfortable until within two weeks of her death, which occurred October 20, 1904. There was no autopsy, but every evidence of the mesenteric glands and stomach being involved. The breast scar showed no return of the growth, and in every way she had enjoyed perfect use of her arm.

In April, 1897, I saw, in consultation, Mr. H. J., aged 56, husband of Mrs. E. J., the case just reported, who presented a good family history. He gave a record of an enlargement of the right testicle, sarcomatous in character, and later confirmed by our pathologist. A thorough operation was done for removal of the diseased organ, and he remained well for years. There was no return of growth in cicatrix nor metastasis, as shown at the autopsy. Mr. J. died May, 1900, of arteriosclerosis and great dilatation of heart.

In September, 1897, I had seen the third sister in this family, Mrs. F. J., aged 51, and mother of six children. At that time she called my attention to a sore she had noticed under right breast, in the flexure of the skin, which had existed for several months, and which frightened her greatly. It had all the appearance of a true epithelioma. She begged not to have the knife used, and I treated it with Vienna caustic and arsenious acid paste. The ulcer healed kindly and remained well, she passing her menopause without any growths appearing elsewhere.

From May, 1903, I had this same patient, Mrs. F. J., under observation for prolapse of the uterus, second degree, with a constant leucorrhœal discharge, occasionally tinged with blood. I made a number of careful examinations, and was unable to locate any malignant growths. Under the use of douches, and the wearing of a rubber ring pessary, she was made very comfortable. She begged of me not to mention an operation, saying she was "too old," and then, "You know what our family history is." October, 1905, she noticed a small tumor in left breast. After examination I had not the courage to tell her my worst fears; however, I kept close watch of the growth, and on January 10, 1906, insisted upon an immediate operation. Passively she consented, and the operation was done at the Albany Hospital three days later. She was now 60 years of age. I did a thorough dilatation and curette ment of the uterus, repair of perineum, removed several hemorrhoids, and while under ether made a complete examination of pelvis and abdomen. There was no abnormal condition present. I then removed the left breast and contents of axilla.

Microscopical examination at the laboratory showed the case to be carcinoma of the breast, with metastasis to lymph-nodes; chronic endocervicitis, with papillom atous proliferation of surface epithelium.

Patient made a good recovery, normal in every respect.

In May, 1896, Miss G. J., daughter of Mrs. F. J., the third sister, whose case I have just reported, met with a severe accident, accompanied with concussion of the brain. She, however, made a good recovery. Later she passed through a severe attack of typhoid fever. Patient had always been a strong, bright, active girl, fond of outdoor sports. Not long after her convalescence she developed epileptic seizures, at times very serious, then better; she lingered some years, and died May 15, 1900, with marked symptoms of tumor of the brain.

I had transferred this patient to the care of a specialist, was absent from the city at the time of her death, and have been unable to get a copy of the post-mortem notes; however, I have been told that the case was considered to be one of sarcoma of the brain, or, as we would now call it, a glioma.

Here, then, is a history of cases that is very impressive.

The first, that of Mrs. P. R., acute carcinoma of the breast and sarcoma of the brain.

Though with the subject thoroughly in mind, and for the fifteen years following I did much autopsy work, and had a large surgical practice, yet I seldom saw a case arousing my suspicions as to the duality of malignant disease. The group of remarkable cases awakened my early thoughts and impressions. Certainly, in the case of Mrs. E. J., the fourth sister, we had an acute carcinoma of the left breast, later an ovarian cyst giving the macroscopical appearances of sarcoma, yet, upon microscopical examination, proving to be carcinomatous degeneration; later, a third operation, mostly exploratory, revealed the pelvis filled with a mass of the same character, yet carcinomatous from specimens removed.

In the case of Mrs. F. J., the third sister, we had, clinically, true epithelioma, yet, nine years after, the latter patient developed acute carcinoma of the left breast, with removal.

Her daughter's case is certainly one of great importance. Did her typhoid attack excite

and aid in developing a condition of sarcoma, latent for a time after the traumatism?

Is it not a strange coincidence that the husband of Mrs. E. J., the fourth sister, should present a condition of sarcoma?

It will be borne in mind that all four of these sisters had more or less care of their father during his long illness. Did the mental atmosphere tend in the least to develop these malignant cases, as well as that of the brother-in-law?

The fifth and youngest sister in the family group died at the age of 50, from heart trouble, but she had previously been treated for a long period for some uterine disease, the exact nature of which I have been unable to ascertain.

Say what we may on the subject of heredity in malignant and other constitutional diseases, must we not admit there are apparently types of transmission that are beautifully shown in the histological studies between sarcoma and carcinoma?

In my early years of student life and practice it was my sorrow to witness the death in many a family of several of its members from transmitted consumption. To-day we understand fully the term "inherited tuberculosis." May we not hope that in studying groups of cases, such as I have presented in this paper, something will be brought to light which will help to unravel the mystery that surrounds the malignancy of carcinoma and sarcoma?

Can we ever hope that some day a serum may be discovered that in its use will control and arrest such conditions as I have just reported?

It has often occurred to me that we cannot say it is due to heredity; yet, what is the explanation to be made in those impressive cases that come to us where we have multiple conditions of malignancy in the same family, following in one or more generations, and where we have reason to believe there is a variety of malignancies, under different classifications, springing up in the same patient?

In the study of these cases the thought of house infection is to be considered. The first two sisters were born in the house where the uncle passed much of his time, when suffering from malignant growth of the foot. The last two were born and lived in the house where the father was attacked with epithelioma of the lip and face, and where he was ill for a long time. Each of the houses referred to was old at the time of the birth of these children. One is yet standing, but in neither have I been able to learn of any more or other cases of malignancy.

It is somewhat interesting to note that of the four sisters it was the left breast implicated in each case.

The writer has a record, and has seen a number of cases of carcinoma of the breast in females who had non-malignant fibroids of the uterus, and in operating for the former, malignancy did not develop in the latter. He has also operated for both conditions when the strength of the patient would admit, always bearing in mind the sympathy between these organs in malignancy of either.

As far as possible, the writer has looked up the literature, which is exceedingly meager, bearing on the subject of this paper, and desires to present the following extracts, also having in mind, as regards ætiology, pathology, and possible prophylaxis, the admirable work of Professor Jensen of Copenhagen, to whom was awarded the Walker prize by the Royal College of Physicians and Surgeons.

Westminster Hospital Report, London, vol. xiv, pp. 324–327, 1905. Cases illustrating the occurrence of histologically different types of neoplasm in the same person.

Clinical Reports, Westminster Hospital, vol. iii, pp. 1335–1350. Amputation of right fore quarter for large sarcomatous growth of axillary region. With tumor of right mamma and ulcer of right thumb.

Note. It seemed at the time as if all three conditions were the same, but, histologically, there was absolutely no resemblance. Ulcer of thumb and axillary growth sarcomatous; breast tumor fibroadenoma.

Westminster Post-mortem Book, vol. xv, p. 203. Cancer of breast. Secondary deposists in brain, lungs, adrenals, kidney, and bladder.

Note. Growths in kidney and lungs sarcomatous.

Westminster Post-mortem Book, vol. xv, p. 37. Case of carcinomatous stricture, with ulceration at middle third of œsophagus.

Note. Microscopically, the greater part of growth showed a typical sarcomatous structure. No doubt but that the initial growth was, however, a squamous-celled carcinoma. Often there is great difficulty in deciding whether a growth, primarily, should be called sarcoma or carcinoma.

Deutsche Medizinische Wochenschrift, vol. xxx, p. 49. Multiple primary tumors. In his article entitled

"Ueber multiple Primartumoren," in the *Deutsche Medizinische Wochenschrift*, Prof. Dr. P. Grawitz bases the same on a case which showed:

a. A uterine myoma.

b. Sarcoma of the ligamentum latum with metastases.

c. A carcinoma of small intestine.

DR. BLACKBURN. Pathological Supplement, Thirty-ninth Annual Report of Government Hospital for Insane, United States Army, 1894. Three entirely independent neoplastic growths in the same patient.

a. Endothelial sarcoma of dura mater.

b. Carcinoma of stomach.

c. Round-cell sarcoma of right testicle.

C. F. BEADLES. Transactions Pathological Society, London, vol. xlviii, p. 245, 1897. Carcinoma of right breast, with sarcoma of skin of groin.

EDINBURGH MEDICO-CHIRURGICAL SOCIETY, December 2, 1896. Mr. Cathcart exhibited a specimen of melanotic sarcoma and one of scirrhus carcinoma removed simultaneously from the same patient.

J. A. WYETH. New York Polyclinic, vol. ix, pp. 84–86, 1897. Notes on three cases of sarcoma and carcinoma.

GRIFFEN AND DARTIGUES. Bull. Soc. Anatom. de Paris, vol. lxxiii, pp. 570–572, 1898. Primary cancer of œsophagus and hemorrhagic sarcoma at the site of an old operation.

DR. HABERER. Klinik von Eisesberg. Allgemeine Krankenhaus in Wien. Archiv. für Klinische Chirurgie, bd. lxxiii, p. 609, 1904. Sarcoma and carcinoma in the same person.

DR. H. LANDAU. München Medizinische Wochenschrift, No. 52 and No. 14, p. 650, 1905. Carcinoma and sarcoma in the same person.

OBENDORFER. München Medizinische Wochenschift, vol. lii, pp. 1477–1481, 1905. Concerning the multiplicity of tumors.

BERLINER KLINISCHE WOCHENSCHRIFT, No. 16, April 16, 1906.

E. H. BASHFORD, M. D., Director of the Laboratory of the Imperial Cancer Research Fund, London. A few remarks on the methods of producing experimental cancer.

From Professor Landau's clinic in Berlin the author is indebted to Dr. Ludwig Pick, pathologist, for the statement that their records do not show a single case of dual malignancy. Dr. Pick, however, has searched the German literature, and remarks the small number of clinical investigations reported on this subject.

Professor Errich Lexer of Königsberg, writes that for the past fourteen years, while serving as assistant to Professor von Bergmann, no case has presented itself in the clinic with a dual malignancy. Speaking for his own clinic now at Königsberg, to which he has but recently been summoned, he can give no definite information.

Professor Ludwig Rehn of Frankfort-on-the-Main states that he has never met with a case of dual malignancy.

When one reviews the literature in its meagerness, the doubt is raised if there has ever occurred, *clinically*, a dual malignancy in the same patient, at the same time, notwithstanding the several cases reported, apparently, in the affirmative.

From Professor Ehrlich's investigation on mice, as to the pathogenesis of cancer, we learn, in brief, that:

a. In several cases, sarcoma and carcinoma were produced simultaneously in the same animal, apparently, but that the sarcoma seemed to succumb to the carcinoma and eventually disappeared after several generations.

b. After some generations it was found impossible to vaccinate successfully with carcinoma a mouse whose parents had also been vaccinated.

c. From crisscrossing the tumors between rats and mice the tumor life was indefinitely prolonged.

From Dr. Haberer's paper I beg leave to cull the following references in the literature:

1. KLEIN. Jahresberichte des Geburtshilflich-gynäkologischen Institutes der Universität Würzburg für das Jahr 1889. Münchener Med. Woch., 1890.

2. KRETZ. Zwei malingue Neubildungen in einem Individuum. Wiener klin. Woch., 1893, No. 11.

3. BECKER. Zur Casuistik multipler primärer, Geschwülste. Beiträge zur klinischen Chirurgie, 1895, bd. xiv.

4. NIEBERGALL. Sarcom, Carcinom, Myom und Schliempolypen an ein und damselben Uterus. Archiv. f. Gynäkologie, bd. l, 1896.

5. EMANUEL. Ueber gleichzeitiges Vorkommen von Carcinom und Sarkom im Uteruskörper. Zeitsch. f. Geburtshülfe u. Gynäkologie, bd. xxxiv, 1896.

6. WALTER. Ueber das multiple, Auftreteten primärer, bösartiger Neoplasmen. Langenbeck's Archiv., bd. liii, 1896.

While I am not personally conversant with the papers, I learn from Dr. Haberer's article that Professor Hansemann of Berlin made mention of a case of glioma of the brain, ulcerating stomach myxoma, and a liver sarcoma, in the same patient, reporting it in 1897, in an article entitled "Die mikroskopische Diagnose bösartiger Geschwülste"; that Dr. Franqué saw two cases of carcinoma and sarcoma occurring in the same uterus, which he reported

in an article entitled "Ueber Sarcoma uteri," *München. Med. Woch.*, 1898, No. xli; and lastly, from Grunfeld we learn of a case of this description, which he reports under the title "Zur Dupplicitat malinger protopatischer Tumoren," *München. Med. Woch.*, 1901, No. xxxii.

In this same article by Dr. Haberer we note the report of a case occurring in the service of Professor von Eisesberg, of spindle-celled sarcoma of the epiglottis, followed one and a half years later by carcinoma of the tongue.

In the preparation of this paper the writer has been most profoundly impressed with the recent work being done by Drs. Park, Gaylord, Clowes, and Baeslack of Buffalo, which is certainly deserving of our careful study and confidence. It is earnestly to be desired that from their investigations, along with those of Professor Jensen, Ehrlich, and others, something may be discovered which, in its application to the human family, will relieve the fearful suffering that yet accompanies the malignancy of carcinoma and sarcoma.

From the frequent study of Ehrlich and others the author is prone to ask the question, whether an antitoxine will some day be found, say from carcinoma, that, used in the human system, will destroy sarcoma, or using that of sarcoma, destroy carcinoma.

THE TREATMENT OF CONGENITAL DISLOCATION OF THE HIP BY INCISION[1]

By E. H. BRADFORD M. D., Boston, Massachusetts

At the present stage of the development of the treatment of this deformity, there can be no question that the operation of choice is that of reduction by operative manipulation. This is not only the simplest and safest method, but in a considerable number of cases most satisfactory results can be obtained without the employment of any other means. In a not inconsiderable percentage of cases, however, complete ultimate success is not obtained, and the cases are either to be classed as failures, or, at best, as only somewhat improved.

It may be premised that by a success in the reduction of congenital dislocation of the hip is meant the placing of the head in its normal position in the acetabulum, enabling the joint to exercise the function for which it was intended. A functional success, or transposition, as it has been termed, where the head remains without the socket, can only, with accuracy, be considered as a failure, even though the patient is somewhat benefited by the surgeon's endeavor.

The causes of these failures have been carefully considered, and are attributable either to imperfect reduction, or to a lack of the proper anatomical relations needed for securing permanent reduction. In the latter category — absence of the acetabulum — great distortion of the head or acetabulum may be regarded as relatively rare; and the former, viz., imperfect reduction (meaning by that the failure to stretch the contracted and shortened soft parts in such a way that the head can be placed opposite, or within the socket), is at present not to be considered, in the hands of surgeons experienced in this procedure, a usual cause of ultimate failure.

The subject, therefore, is of importance where the anatomical conditions are adequate for reduction and where the usual amount of skill is employed in the attempt at manipulative reduction, if the final results are not those of complete success. It will be conceded without question that these failures occur, and the proper treatment in such cases is a subject for the careful consideration of the surgical world, provided the treatment of this deformity is to be placed upon a basis of greater exactitude than at present is the case, even in the practice of surgeons of experience.

The causes usually assigned for these failures

[1] Read before the American Surgical Association, Cleveland, Ohio, May 31, 1906.

are as follows: 1. A shallow condition of the acetabulum; and 2. A lax or faulty condition of the capsule. As to the shallowness of the acetabulum, after skiagraphic records are taken of cases of congenital dislocation, a so-called shallow acetabulum will appear to exist in a considerable number of cases, especially in young children. Should these *data* be considered conclusive, it would be found that the number of cases which could successfully be treated by manipulative reduction would be exceedingly small. Such facts, however, are not in accord with clinical experience, where it is not uncommon to reduce successfully a hip, as shown by the evidence of the characteristic slipping of the head over the acetabular border, while on X-ray examination it will appear that no such acetabular border exists. Furthermore, on X-ray examinations in many instances, successful reduction has been accomplished, even where, on skiagraphic examination, a shallow acetabulum is present, and where, after several years of observation, the normal acetabular lip is seen in later skiagraphic pictures to have been developed.

The explanation of this apparent anomaly will be found in the fact that the bony rim of the acetabulum in all cases in children, to a certain extent, and to a much greater extent in congenitally dislocated hips, does not project enough to retain the femoral head without the elongation of the cartilaginous border; viz., the cotyloid ligament and the capsular ring (zona orbicularis). Where the head is held firmly by this cartilaginous cup, in infants, the hip is held firmly in place. Where, in fœtal congenitally dislocated hips, the head is not so held, the femur can be pressed upwards and backwards, and the condition known as congenitally dislocated hip results. This dislocation is loose or firm according to the strength of the contractions and adhesions of the distorted capsule, and the reduction is complete or a failure according to the success of placing the head within the cartilaginous rim which completes the acetabulum.

This statement can be demonstrated by an examination of a series of normal hips in children, from the fœtal stage up to that of adolescence, showing the gradual development of what may be called an acetabular or bony shallowness up to the shape of the acetabulum seen in adults. This can also be made even more convincing by the examination of the pathological condition of the acetabulum in such specimens of dislocation of the hip as have been subject to careful examination. These range from specimens in fœtal life to those of adults.

Other changes of importance in this connection are the changes in the condition of the capsule. As is well known, and as was shown in the classical paper of Carnochan, in the congenital dislocation of the hip-joint the capsule is not torn, but is stretched upwards, and the acetabulum is covered by the lower portion of the capsule stretched like a drumhead across the cavity.

The changes that take place after locomotion in the capsular structures are of importance. The capsule becomes thickened and stronger as it becomes a weight-bearing band passing from the head and neck of the dislocated femur to the pelvis. Firm abnormal connections are

Fig. 1. Dissection of congenitally dislocated hip, showing distorted capsule. (After Carnochan.)

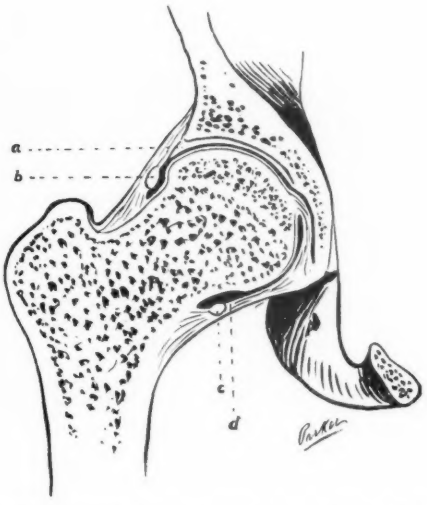

Fig. 2. Frontal section through normal right hip-joint.
a. Labium glenoidale. *c*. Zona orbicularis.
b. Zona orbicularis. *d*. Cavum articulare.

developed in periarticular ligaments to both the pelvis and the femur. The capsular attachment around the head of the femur will be found less around the neck and more around the end of the head of the femur than is the case normally. There are firmer attachments, also, to the lesser trochanter, and often strong bands running between the lesser trochanter and the upper borders of the acetabulum.

In addition to these, there are the changes in the interior of the capsule. Normally, the capsule consists of a bag, which passes from around the rim of the acetabulum, containing in its walls the cotyloid ligament, and is attached to the neck of the femur just below the head. As the head is well placed against the bottom of the acetabulum, no fold of the capsule lies between it and the acetabulum. In a congenital dislocation of the hip, in addition to the changes in the walls of the capsule, abnormal cartilaginous developments may take place. Where the capsule is drawn tightly upwards and backwards, is distorted, the fibrocartilaginous structures which normally lie in the capsule around the neck (the vestige of the cotyloid ligaments and zona orbicularis), instead of being placed around the neck, are stretched between the head and acetabulum. Under certain conditions—and at present we are unable to know what those conditions are—this fibrocartilaginous collar, with its tendency to develop as a constricting band, becomes constricted in front of the dislocated head, and constitutes an obstacle to the successful reduction, lying close to the shallow bony rim of the imperfect acetabulum. In some instances this constriction makes the lumen or cotyloid ring in the capsular ring relatively large. In other instances the lumen is much smaller than the head. In other instances, while the lumen may be sufficiently large, abnormal developments in the growth of the vestiges of the cotyloid ligament are to be found in the lower border and inner portion of the acetabulum, constituting abnormal fibrocartilaginous folds at the lower portion of the acetabulum.

In what percentage of cases the lumen of the capsule is as wide as that of the head, and in what it is smaller, it is impossible to say. Judging from the examination which is possible where an incision is made into the dislocated hips, it would appear that some constriction of the capsular lumen exists in a third of the cases in children under ten years of age. Where this constriction is not great, it may be reasonably supposed that it is entirely ob-

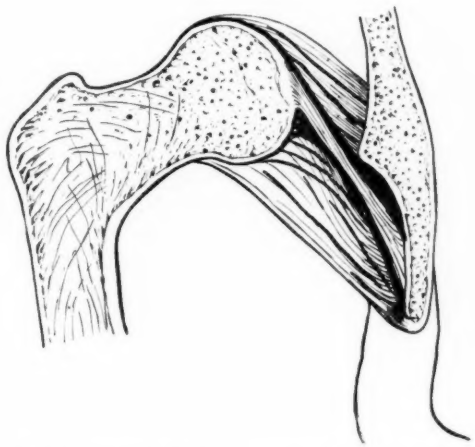

Fig. 3. Frontal section of congentially dislocated hip, showing distortion of capsule and obliteration of glenoid lip and orbicular zone.

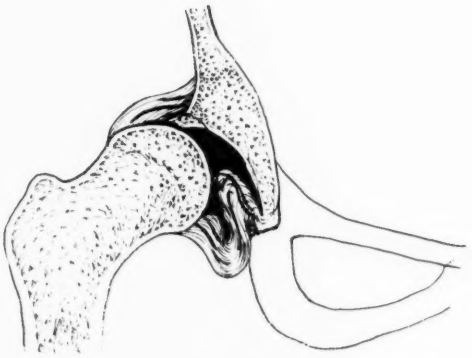

Fig. 4. Frontal section, showing imperfectly reduced congenitally dislocated hip with the head imperfectly passed through the capsular constriction, and capsular fold between the head and bottom of the acetabulum.

literated by the stretching and manipulations used in manipulative reduction, and that it is not difficult to pass the head of the femur through the capsular lumen well into the acetabulum. Where, however, abnormal developments of the vestiges of the cotyloid ligament exist, and there is present a tight and firm band of fibrocartilage between the head of the femur and the bottom of the acetabulum, it is manifest that no amount of stretching will be effectual, and the reduction, even of the head, simply presses this mass of fibrocartilage into the acetabulum, which forms a cushion between the bone and the femoral head. In other instances, even where the capsular lumen is sufficiently large to permit of the passing of the head into the acetabulum, if abnormal cartilaginous folds or capsular wrinkles are present at the lower border of the acetabulum, the head is not introduced into the socket to a sufficient depth.

The condition of the reduction may be likened to that of a large ball placed within a boy's mouth. Where the mouth is sufficiently large to enable the ball to be passed within the rim of the teeth of the upper and lower jaws, the ball is imperfectly held if the lower lip intervenes between the teeth and the ball. It has been claimed that the pressure of the head of the femur into the acetabulum will cause absorption of the capsular fold or capsular irregularities lying between the head and the bottom of the acetabulum.

While it is possible that this may be true in a certain number of instances, judging from analogy it cannot be universally true. Fibrocartilage is apparently not absorbed under pressure; the intervertebral disks and the semilunar cartilages remain unabsorbed after pressure and usage for years. It may be considered, therefore, that in a large percentage of cases of failure on reduction by the manipulative method, the fault lies in the fact that it is surgically impossible, by means of manipulation, to place the head of the femur well in the acetabulum, and to surround the reduced head with such a sufficiently firm retaining capsule as will prevent redislocation after the limb is actively used. It may be claimed that the cure of congenital hip dislocation consists not only in placing the head of the femur well within the acetabulum, but in putting the head of the femur in such a relation to the cartilaginous and ligamentous lips of the acetabulum that the femoral head will remain in place.

It is manifest that if this abnormal condition of the distorted cotyloid ligament exists, relief cannot be obtained by repeated attempts at forcible manipulation, but success can only be obtained, if obtained at all, through the aid of incision.

The earlier attempts at reduction by incision were based upon the hypothesis that there was either an absence of the acetabulum, or an imperfect condition of that portion of the joint; that it was shallow and needed to be deepened; that it was filled up by functional extraneous matter. Of the early methods of relief of this deformity by excision of the head, nothing need be said except in condemnation. The early attempts made to place above the head a fold of periosteum may be discarded as inadequate. Attempts to deepen an acetabulum regarded as imperfect, by gouging or curetting the acetabulum, making it sufficiently deep to form a basis of support for the replaced head, have been frequently employed, and have been used by the writer in upwards of thirty early cases. Much has been written in regard to this procedure, but if the facts already presented as to the relative bony shallowness in children are taken into consideration, it will be seen that although it is possible to obtain successful results by this method, anatomical or

pathological facts suggest another method as perhaps preferable. If it is possible to retain any portion of the capsular folds and utilize it as a means of holding the reduced head in place, it is manifestly better to do this than to destroy such tissues. An attempt should be made, not so much to make the hole of the acetabulum deeper, as to render it more effective by reconstructing the acetabular rim.

In performing reduction by incision, certain difficulties are met. First, the difficulty of adequately stretching all the contracted soft parts. This is the difficulty which was practically insuperable in the earlier attempts at reduction by operative means, and it is this which led to the unnecessarily severe methods of excision. At present, owing to the experience gained by the method of reduction by manipulative means, it is possible to overcome all muscular contraction. This should be done thoroughly, previously to any attempt at reduction by incision. This can be done either by the usual means, manual manipulative reduction, or, as is preferred by the writer, by the use of stretching apparatus. All muscular contraction must be entirely overcome, and all capsular shortening also, as far as possible, including, also, the shortened condition of the fascia lata and of the iliotibial band.

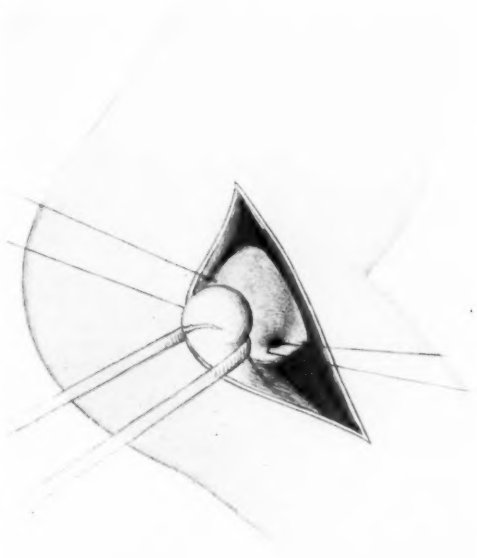

Fig. 6. Separation of head from the capsule, with stitches inserted in the freed capsule.

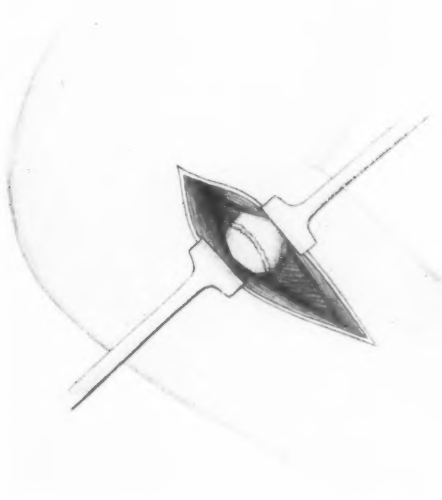

Fig. 5. Incision laying bare the capsule in a congenitally dislocated hip.

This preliminary stretching may be done at the time of the operation by incision, or at a preliminary operation, and may be aided or not by tenotomy, as may be necessary in the individual case; and by tenotomy is meant tenotomy of the iliotibial band of the fascia lata passing over its attachment at the anterior superior spine, and in the severest cases by a tenotomy of the tendon of the adductor magnus. The latter tenotomy, however, will be rarely needed, and should be regarded in most instances an unnecessary procedure, and in mild cases an injurious one, as perhaps leading to a subsequent weakening of the limb.

After the stretching, the head should be reduced by manipulation as far as practical, and passed under the upper acetabular rim, or as near to this as is possible. The patient is to be placed upon the side, and an incision made,

passing from the anterior superior spine obliquely, backwards and downwards. The incision should be made in such a way as to avoid cutting across the gluteus medius muscle. If the dislocated head is placed as near the surface as possible, the incision is more rapidly made, the object being to clear the dislocated femoral head. As soon as the head is cleared by means of incision and blunt dissection, the limbs should be twisted in such a way as to bring the head as far forward as possible, and a cross-incision should be made of the capsule where it is joined to the head. The cut portion of the capsule on the side nearest the acetabulum should be seized by pressure-forceps and secured by sutures, and the head entirely freed from its capsular attachment.

The attachment of the capsule to the lesser trochanter and to the femoral neck should also be severed, care being taken that the cut capsular border shall not be lost, but retained by strong silk sutures. It is then necessary to pull the head of the femur well away from the wound. The capsular lumen should be then thoroughly inspected, not only the portion which has been close to the femoral head, but also that portion which is in close contact with the bony rim of the acetabulum. It will not infrequently be found that although the capsular lumen may seem sufficiently large, exploration by the finger will show cartilaginous or capsular irregularities near the bottom of the acetabulum. Where the ligamentum teres is not absorbed, it will be necessary to divide this, in order that the surgeon may have sufficient room for proper examination of the capsular lumen. The rest of the procedure resolves itself into the simplest methods of passing the head through the capsular lumen well into the bottom of the acetabulum.

It must be repeated that for this it is essential that all muscular contraction shall have been overcome. Even with this, however, in some instances it will be found difficult to slip the head well into the acetabulum without crowding portions of the capsule before it. The surgeon should, after careful examination, determine whether the passage of the head through the lumen will be easy or difficult. Where it is difficult owing to the constriction of the capsular lumen, dilatation of the capsule is necessary. This is best done by securing the capsular

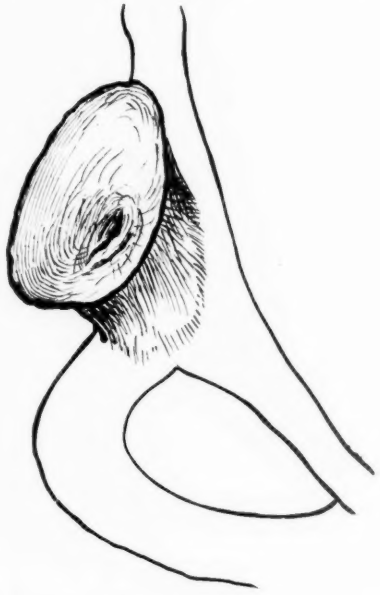

Fig. 7. Diagram indicating capsule in a congenital dislocation without capsular constriction.

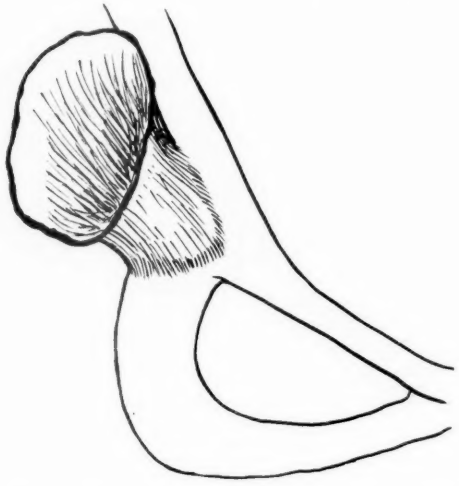

Fig. 8. Diagram indicating capsule in a congenital dslocation with uarked capsular constriction.

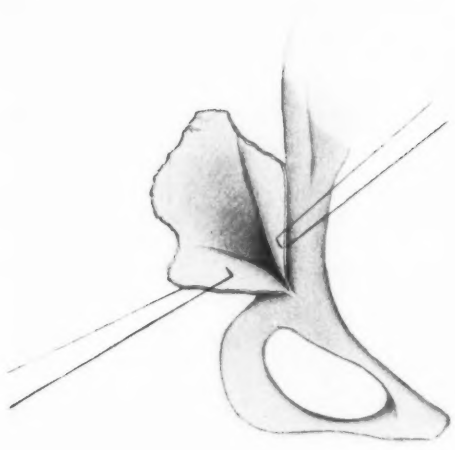

Fig. 9. Diagram indicating incision of capsular constriction down to the acetabulum.

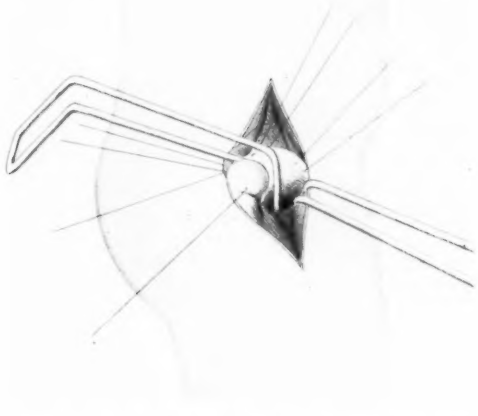

Fig. 10. Dilatation of the capsular lumen after division of capsular constriction, preparatory to insertion of the head of the femur and stitching capsular flaps around the reduced head.

walls by strong silk sutures, making the capsule tense, and passing the finger well into the capsular lumen, placing the blunt point of a herniotomy knife well down into the bottom of the acetabulum, and cutting directly downward.

It will be thought that a certain amount of risk is run in the possibility of the division of some branch of the profunda artery. This risk cannot be regarded as greater than that incurred in the ordinary operation of herniotomy. It is, however, a risk that is to be considered. In the experience of the writer, this danger is not great. In only one instance of the operation by incision attempted at the Boston Children's Hospital was any considerable bleeding encountered in incision of the capsule. This was checked by enlarging the wound, separating the attachment of the quadratus femoris, and securing the bleeding-point by pressure-forceps.

After the capsule has been divided in this way, attempts should be made to place the head well in the acetabulum, without folding in of the capsule as the head is introduced. In cases of difficulty, the writer has made use of especially constructed retractors, which are passed, one above and one below, well into the bottom of the acetabulum, pressing like a shoehorn the tissues away from the introduced head. After the head has been placed well in the acetabulum, it is necessary that it shall be secured in this position in such a way that it will not

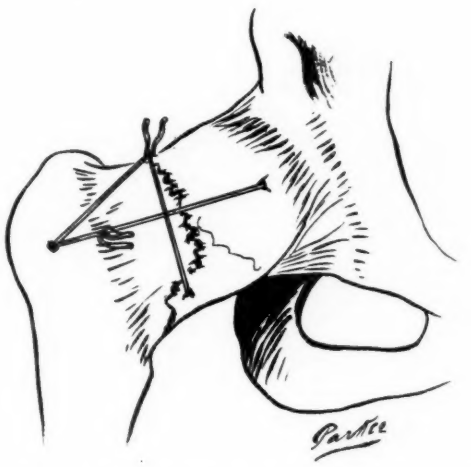

Fig. 11. Right hip-joint, showing sutures placed around the reduced head.

slip, and various means have been tried for this purpose. The suggestion of Codivilla, that the head of the femur be tunneled, and that the ligamentum teres be passed through and secured in the tunnel, is not only an ingenious but a brilliant one, but as the ligamentum teres is absent in many instances, it cannot always be relied upon for the purpose of holding the head from slipping.

For this purpose sutures can be utilized, the neck of the femur can easily be pierced, and a silk or chromicized catgut suture passed through the neck of the femur. This can be tied to the silk sutures which have been passed and the limb placed in a fixation bandage or a retention apparatus.

The position in which the limb is placed is one which requires considerable thought. While the frog position is serviceable after manipulative reduction, its value is less after reduction by incision, and it will be found that the most convenient position will be that of the limb abducted to about forty-five degrees. A plaster-of-Paris bandage is applied and a window cut over the wound. In later cases the writer has been in the habit of trying a retaining-splint, avoiding the need of plaster bandages, but as the number of cases in which this has been

Fig. 12. Congenital dislocation of the hip relapsed a year after manipulative reduction.

firmly through the capsule. The head of the femur can in this way be well secured close to the acetabulum. The writer has tried various methods of passing sutures in the capsule, but this is a matter which can be left to the manipulative skill of different surgeons, who will, in employing the method, use different means to accomplish the desired result, which is, not only to secure the head of the femur well in the socket with the certainty that no capsular folds or cartilaginous obstacle lies between it in the bottom of the acetabulum, but also to place the parts in such a position that cicatrization will develop a retaining ring around the neck of the femur. The wound is then closed, tried is at present but few, a definite opinion as to the value of this method cannot yet be formed. In the ordinary case the wound heals by first intention, and at the end of three weeks the surgeon is able to determine whether a satisfactory result has been obtained or not.

The dangers which are met are, first, the danger of sepsis, and second, the danger of inadequate retention of the head in the socket and consequent slipping and failure. The former danger will always be present, and demands unusual care. In a number of cases of incision of the hip it will be found that some elevation of temperature follows the operation, even if careful aseptic precautions have been

employed. This is explained by the fact that it is extremely difficult to prevent the introduction of some skin cocci into the wound, the acetabular cavity not being furnished with absorptive walls, as the peritoneum, and is therefore intolerant of any fermentation of retained fluids. It is also often difficult in very young children to prevent, in all instances, contact of urine with the dressing, and for this reason not only is the greatest care needed, but the employment of the method of incision itself

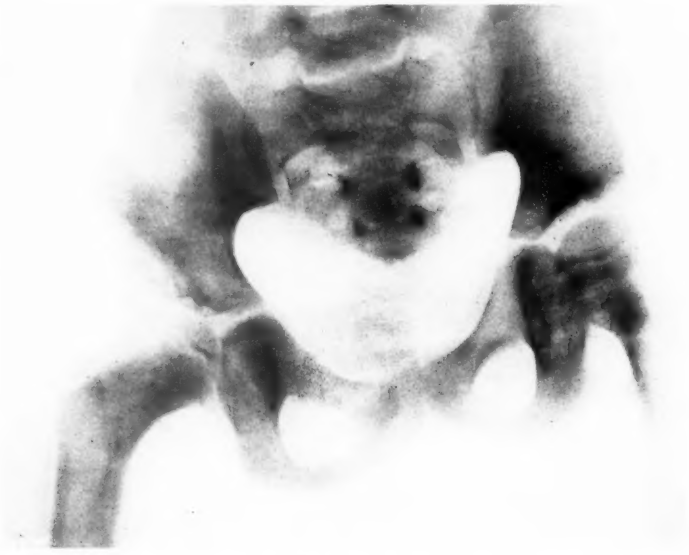

Fig. 13. After reduction by incision, showing the head placed deep in the acetabulum, held in place by sutured capsular flaps.

may be regarded as a grave one in very young children.

Theoretically, it is possible in all cases to prevent sepsis, but, practically, the risk of sepsis must be always seriously considered. It is also theoretically possible to secure by proper sutures the head of the femur, so that it may not slip from the acetabulum until such time as the tissues have resumed their normal retaining power, and dislocation does not occur. Practically, however, difficulty is often encountered in securing the sutures with such accuracy as to serve as a means of retention during the period of healing. This is a difficulty which greater experience may be expected to overcome as the surgeon learns the exact point for the insertion of the retaining sutures.

The choice of the retaining sutures—silk, chromicized catgut, or kangaroo tendon—is one that will necessarily vary with the experience of different surgeons. The objection to silk sutures is that they will tend toward a limitation of the motion at the joint. The objection to other suture material, such as catgut or kangaroo tendon, is the possibility that it may be absorbed before the retaining tissues have regained a sufficient amount of strength. These are matters which experience may be expected to settle.

Although the writer has performed the operation of reduction by incision in upwards of 50 cases, the method here presented has been performed in only 17 cases, and the statistics of these last cases are presented as indicating the value of the procedure. In 15 of these, the method was used only after the failure of the method of reduction by manipulative means. In two, the operation was performed for dislocation following acute arthritis of infancy.

A death is recorded from septicæmia in one of the cases. In this case the child was three years old, and the operation was performed in a double congenital dislocation, because of the failure in retaining the hip in its place after manipulative reduction. At the time of the incision a sufficiently large opening was found in the capsular ring for the introduction of the head, but it seemed impossible, owing to the laxity of the capsule, to retain the head in the acetabulum. The wound became contaminated by urine in after-treatment, and violent sepsis followed, with death two weeks after the operation. The wound had been sewed up, and the result might have been different if an open wound had been left. The result indicates the danger in operating upon a young child.

In the other cases, success was secured in 14 cases out of 19 operations (3 cases being double), with 4 failures and 1 death. By "failure" is meant the non-retaining of the head firmly into the acetabulum.

An objection to the operation which suggests itself is the stiffness of the joint which might be supposed to follow. This danger will, in all probability, always be greater after incision than after manipulative reduction. How great this danger of permanent stiffness is in reality the writer is unable to determine as yet, as the cases on which the method has been used have not been under observation a sufficiently long time, but it is probable that the danger of permanent after-stiffness is one which can be expected to diminish with increasing operative skill. At present the danger appears to be greater than that following the manipulative method.

It should be admitted that the procedure is one which presents difficulties to the surgeon. The operation is not a light one, and involves a certain amount of risk. It is, however, believed that greater experience will diminish both the risk and the difficulty, and increase the certainty of the method. As has already been said, the method of reduction by manipulation will, in all probability, always remain the method of choice, but in the event of failure, reduction by incision, properly conducted, can be relied on as offering the only remaining and a satisfactory method of cure.

The following statistics, taken from the records of the Boston Children's Hospital, are of interest.

Date	No. of Cases	Method		Success	Failure
1884–1896	21	Incision and curettage	12	0	12
		Manipulation under anæsthetic	2	0	2
		Mechanical means	7	0	7
			21	0	21
1896–1902	54	Incision	34	11	23
		Manipulation	20	1	19
			54	12	42
1902	22	Manipulation, including six operated on by Professor Lorenz	20	8	12
		By open incision	2	0	2
			22	8	14
1903	33	Manipulation, including mechanical stretching	32	22	10
		Incision	1	0	1
			33	22	11

The following table continues the tables of cases previously reported of cases treated at the Boston Children's Hospital from 1884 to 1903. (*Boston Medical and Surgical Journal*, July 28, 1904.)

CASES TREATED BY MECHANICAL STRETCHING AND MANIPULATION

January 5, 1904, to April, 1906

Name	Date	Age	Sex	Hip	Remarks
McK.	Jan., 1904.	5	F.	Single.	Unsuccessful.
M.	Jan. 14, 1904.	3	M.	Right.	Unsuccessful.
J.	Jan. 22, 1904.	12	F.	Right.	Unsuccessful.
W.	May 25, 1904.	3	F.	Double.	Successful.
W.	July 21, 1904.	4	F.	Left.	Unsuccessful.
M.	Aug. 16, 1904.	3	M.	Left.	Successful.
C.	Oct. 4, 1904.	4	F.	Left.	Unsuccessful.
C.	Oct. 6, 1904.	13	M.	Right.	Successful.
C.	Oct. 11, 1904.	7	F.	Double.	Unsuccessful.
H.	Oct. 18, 1904.	3	F.	Double.	Unsuccessful.
B.	Oct. 22, 1904.	7	F.	Double.	Unsuccessful.
D.	April 11, 1905.	3	F.	Double.	Successful.
R.	May 2, 1905.	9	F.	Right.	Successful.
C.	June 7, 1905.	3	F.	Double.	Unsuccessful.
C.	July 17, 1905.	3	F.	Double.	Unsuccessful.
C.	June 12, 1905.	9	M.	Double.	Successful.
McN.	Oct. 19, 1905.	7	F.	Left.	Unsuccessful.
F.	Nov. 7, 1905.	6	M.	Double.	Successful.
L.	Nov. 21, 1905.	4½	F.	Double.	Successful.
S.	March 8, 1906.	2½	F.	Left.	Successful.
W.	April 19, 1906.	8	F.	Left.	Successful.

A total of 21 cases; 10 successful and 11 unsuccessful.

By "unsuccessful," in this table, is not meant that the reduction was not made, nor that the child's gait was not improved. As "unsuccessful" are classed cases of so-called functional cures and anterior transpositions. By "successful" are classed only those cases where the reduction has been made, and where there is reason to believe the hip will remain permanently in the socket.

In addition to these, one case of double dislocation, in a girl of eight, was operated upon outside of the hospital, where the hips were successfully reduced, but death took place three days later, probably of aciduria. Adding this to the list, the record will be for manipulative reduction: 22 cases; 10 permanent successes, 11 unsuccessful, 1 death. Double dislocations are here classed each as one case, as both dislocations were reduced at one sitting.

HIPS REDUCED BY OPEN INCISION, AFTER FAILURE BY THE METHOD OF FORCIBLE CORRECTION

Name	Date	Age	Sex	Hip	Remarks
[1]D.	March, 1904.	6	F.	Left.	Successful.
[2]P.	March 24, 1904.	11	M.	Left.	Successful.
G.	Sept. 22, 1904.	44	F.	Double.	Successful in one; unsuccessful in other.
[2]T.	Sept. 27, 1904.	4	F.	Right.	Successful.
S.	May 4, 1905.	3½	F.	Left.	Successful.
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C.	Dec. 14, 1905.	4	F.	Left.	Unsuccessful.
[1]W.	Feb. 3, 1906.	4	F.	Double.	Successful.
[1]E.	Feb. 3, 1906.	3	F	Double.	Unsuccessful.
[1]S.	March 8, 1906.	3	F.	Double.	Successful.

		Success	Failure	Death
Total, 16 cases	13 single operations	11	1	1
	3 double operations ..	3	3	0
19 operations		14	4	1

Under the head of successes are classed, in this table, cases where the reduced head has remained permanently in the socket. No attempt has been made as yet to determine the ultimate amount of stiffness following reduction by incision. As has been already said, the impression made by the cases seen in the past year is, that there is greater danger of temporary stiffness requiring treatment following reduction by incision than reduction by forcible manipulation. Whether this stiffness is permanent or not is not yet determined.

Taking the statistics for the year as they stand, it appears that the results from forcible manipulation have, according to the last table, given 45 per cent of permanent reduction, and from the method of reduction by incision, 75 per cent of permanent reduction in cases where forcible manipulative reduction had failed, while for both methods the successes were 55 per cent of successful reduction.

If these later cases be compared with the Boston Children's Hospital earlier statistics (from 1884 to 1896), where few successes were recorded, the progress in the treatment of the deformity will be seen to be gratifying.

A comparison of the percentages of successful reduction by forcible manipulation in 1903 with that in 1904 indicates a smaller percentage of successes from manipulative methods and a marked increase in the percentage of successes from reduction by incision. This can be explained by the improvements in the technique of the methods of reduction by incision, and by the fact that cases which before would have been treated perhaps successfully by a repeated attempt at manipulative reduction were treated on failure of the first attempt by reduction with incision. The figures appear to support the conclusion that reduction by forcible manipulation is the method of choice in average cases, and that it offers 50 per cent of chances of permanent success (anatomical reduction), and that the operation of reduction by incision—a graver procedure—can be relied upon to offer a satisfactory chance of success in cases where the milder method has failed.

The future will probably show an increasing percentage of success in the method of forcible manipulation through improvements in after-treatment, as well as better results from the operation by incision. It seems certain that both methods will find a field of usefulness in the treatment of the deformity.

[1] Double cases; single operations.
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A death is recorded from septicæmia in one of the cases. In this case the child was three years old, and the operation was performed in a double congenital dislocation, because of the failure in retaining the hip in its place after manipulative reduction. At the time of the incision a sufficiently large opening was found in the capsular ring for the introduction of the head, but it seemed impossible, owing to the laxity of the capsule, to retain the head in the acetabulum. The wound became contaminated by urine in after-treatment, and violent sepsis followed, with death two weeks after the operation. The wound had been sewed up, and the result might have been different if an open wound had been left. The result indicates the danger in operating upon a young child.

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THE OPEN TREATMENT OF FRACTURES[1]

By EDWARD MARTIN, M. D., PHILADELPHIA
Professor of Clinical Surgery, University of Pennsylvania

IT will be generally conceded by those having widest experience in the treatment of fracture that the rapidity, permanency, and completeness of cure are proportionate to the accuracy of reduction and retention, and that the great majority of simple fractures can be treated by splints and bandages supplemented at times by extension, with completely satisfactory results. It will also be granted that even when reduction is imperfect and retention is inedequate, fractures, as a rule, unite firmly and are functionally satisfactory, though the resultant deformity be obvious or even gross. It is also true that even though the symptoms of interposition of soft parts between the ends of the broken bones are present, nonunion is by no means an inevitable consequence of conservative treatment. It therefore follows that the cases of recent fracture uncomplicated by wounds which imperatively call for surgical intervention are extremely few.

These statements seem worth while, because of the enthusiastic advocacy of open treatment for all fractures, in which reduction is not perfect, on the part of a few surgeons, who, having operated upon recent fractures have obtained good results. These results, in at least some instances, have not been more satisfactory than such as might have been obtained by more conservative methods, and with infinitely less risk to the patient. The wounds necessitated by the open treatment of fracture are more prone to suppurate than are those made in the performance of other operations. This, partly because foreign bodies, often of considerable size, are buried in the wound, but mainly because, as a result of prolonged manipulation and rough handling, and the use of tools ill adapted to the purpose, there is left at the end of operation a large amount of tissue so hopelessly devitalized that an abundant culture material is provided for even the slight infection which inevitably takes place during the course of the most carefully conducted operation.

L. E. Comminuted fracture of lower end of humerus. Before wiring.

Of the many ingenious devices employed for permanently fixing broken bone ends in their proper relation to each other, chromicized catgut, wire, screws, and silver plates are the most serviceable. If the surgeon could be

[1] Read before the American Surgical Association, Cleveland, Ohio, May 30, 1906.

L. E. Comminuted fracture of lower end of humerus. Before wiring.

assured of a perfectly sterile No. 3 catgut so largely deprived of chromic acid as not to prove irritating to the tissues, this would be the material of choice in all cases where suture or encircling ligature is applicable.

Metal plates, screws, or wires are open to the objection that, even though the wound heal primarily over them, they remain always a potential cause of localizing infection. There are probably few here who, because of discharging sinuses, have not been compelled to remove such foreign bodies from patients who had been reported by their colleagues as permanently healed. The liability of both early and late suppuration is in direct proportion to the size of the foreign body employed. Therefore, from the standpoint of permanency of healing, wire is preferable to either the plate or the screw, though it is by no means immune against late infection. It does not give either the fixation or, as a rule, the accurate coaptation of the latter. The silver wire usually employed is extremely prone to break either at the time of twisting or shortly after. X-ray

J. B. Compound comminuted fracture of both bones of leg. Ten months after plating. Functional and cosmetic results perfect.

photographs have abundantly shown the frequency of this accident. There is little reason to believe that it is less irritating than wire of other metals, and if a non-absorbable suture or ligature be chosen, phosphor bronze or delta metal possessing equal suppleness and greater strength should be employed, since thus a smaller caliber can be used.

Screws are extremely serviceable, in that they represent foreign bodies of moderate size, are readily applied, and will often hold bones in perfect apposition. They are especially

Wiring of transverse fracture of femur. Bad result. (Surgeon unnamed.)

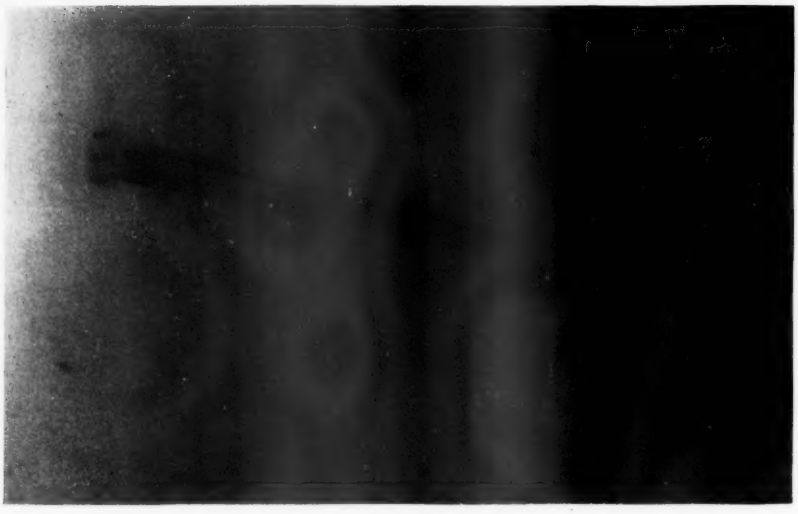
Fracture of humerus. Before wiring.

applicable to the repair of oblique fractures of long bones. In fractures of the extremities of these bones, the cancellous tissue gives a grip so feeble as to make their use of little service, unless driven through and through.

The proper application of a screw implies the selection of an almost cylindrical instrument with a deep thread cut clear to the head, and of such length as to pass completely through the bone at right angles to the line of fracture, but not beyond. Screws selected from the carpenter's tool-box, and the majority of those sold by surgical instrument makers, are ill adapted to the purposes of bone surgery, since

Recent fracture styloid. Showing plate put in seven years before, by John Ashhurst, for compound fracture of radius

Recent fracture styloid. Compound fracture plated seven years ago. Necrosis of ulna. (John Ashhurst.)



Showing type of screw.

the thread is lacking where it is most useful, and the pronounced conical shape greatly and uselessly increases the difficulty of driving the screw home.

The easy application of the screw is dependent on the proper selection of a drill, and the use of a clamp so devised that the bones, having been placed in accurate apposition, are immovably held while the drill is being used and the screws are being driven home. The

L. E. Comminuted fracture. Lower end of humerus. After wiring.

J. B. Compound comminuted fracture of tibia and fibula. Before plating.

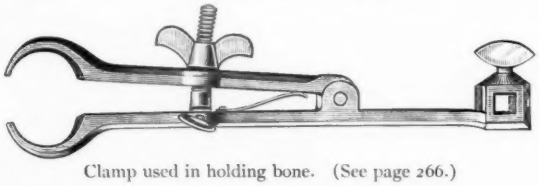
drill should be of such a size that it bores a hole through both fragments the full length of the screw, and of a diameter greater than its core.

When but one of the two fragments is adequately drilled, as the screw is driven in, it pushes the bones apart in place of bringing them together. The same result follows after having used the drill to a proper depth when the relation of the fragments to each other is changed; this frequently happens when the bones are loosely held in the bottom of the

Mrs. Y. Showing high fracture of fibula and tibia spiral fracture.

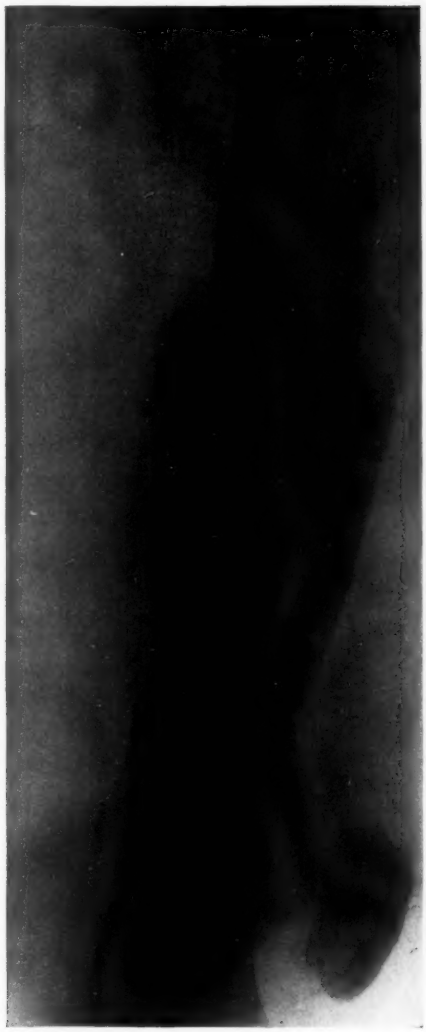
J. B. Compound comminuted fracture of tibia and fibula. Before plating.

Spiral fracture of tibia. Seven weeks after the accident. Good result by splinting.



Clamp used in holding bone. (See page 266.)

J. B. Compound comminuted fracture of both bones of leg. Before plating.

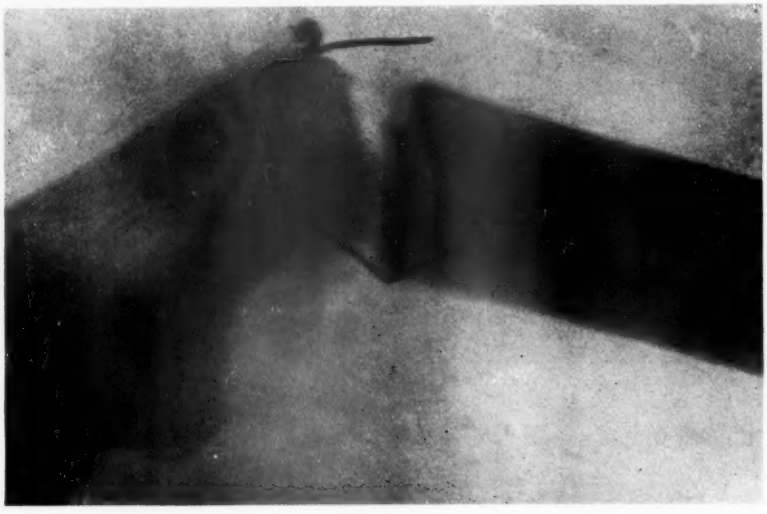


Comminuted fracture of femur. Suited to plating and wiring.

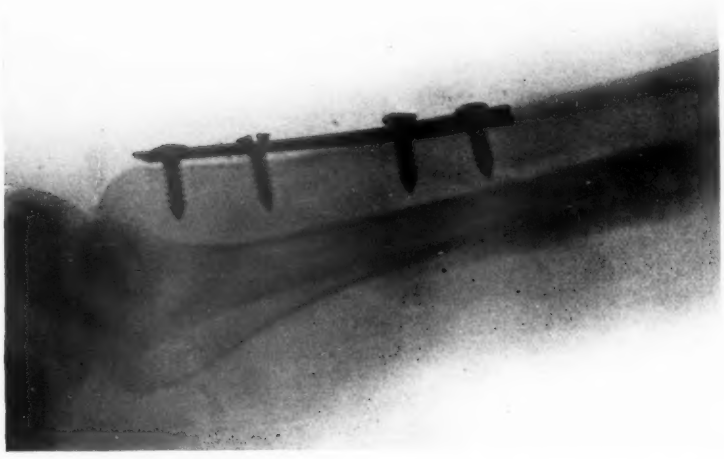
Plating for delayed union of transverse fracture of femur. Result bad. (Surgeon unknown.)

wound by the fingers of an assistant. This should be obviated by the use of bone-clamps, which should be powerful enough to hold the largest bone in their grasp. One or two days may be needful. Those I exhibit serve the purpose well, as do the forceps devised by Arbuthnot Lane.

The drilling should be done either by an electric or a foot engine. The use of any other instrument is not only awkward and



Transverse fracture of right femur. Nine months after wiring. (Surgeon unknown.)

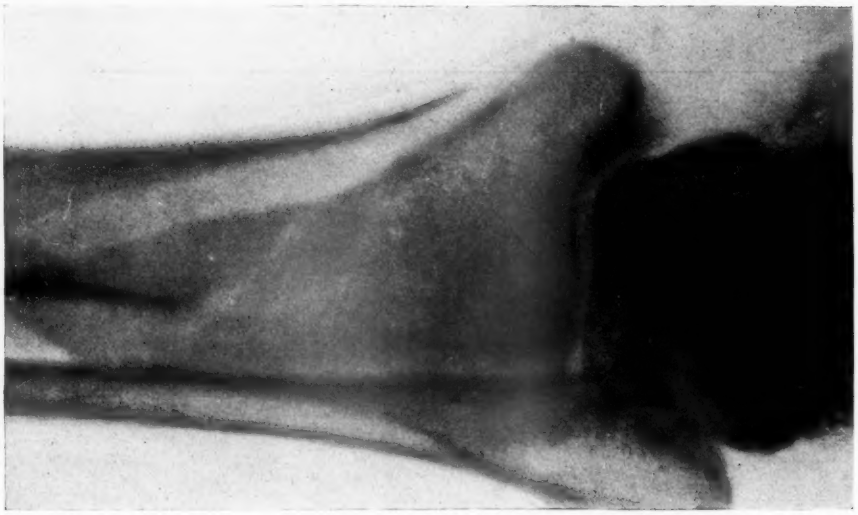


Mrs. Y. Spiral fracture of tibia. Fibula broken high up. Six weeks after plating.

time-consuming, but exposes the patient to the danger of serious trauma. When wire or gut is to be passed through drill-holes, the instrument should be provided with an eye near its cutting end, through which, when it has been driven completely through the bone, can be passed a guiding thread. McCurdy accomplishes the same purpose by a notch placed just above the end of the instrument.

The silver plate finds its most useful application in transverse fractures. Its proper fitting is made by the use of grasping instru-

Compound fracture of tibia and fibula. After removing plate. (Cornett.)



Mrs. Y. Spiral fracture of tibia. Before plating. Shortening one inch.

ments which not only hold the two bones in accurate apposition one with the other, but also secure the plate firmly in place while the holes are being bored and the screws applied. The starting of the screws in the drill-holes, particularly in the treatment of broken small bones, such as the ulna, clavicle, or fibula, or when the fragments to be held in apposition lie at the bottom of a deep wound, is greatly facilitated by a screwdriver which firmly holds

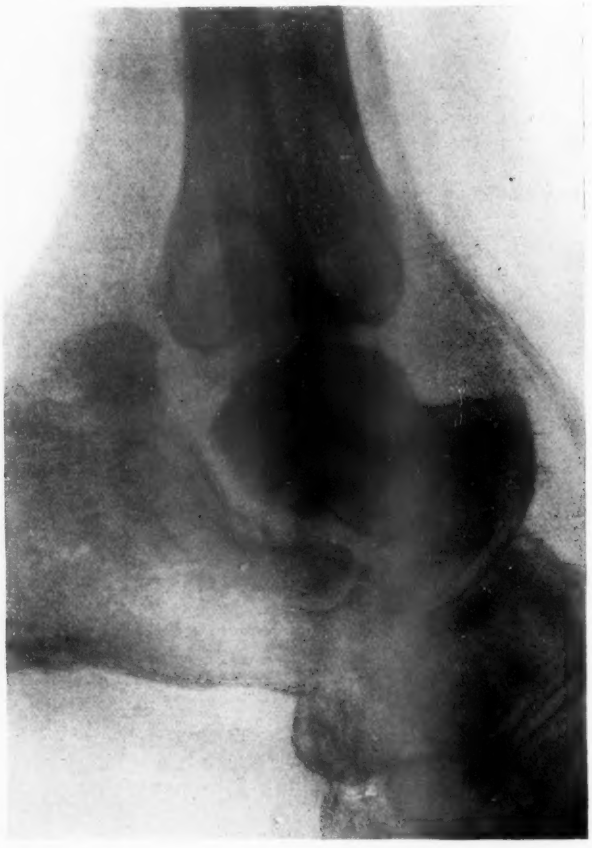
E. V. Fracture of neck of humerus. Before wiring.

Compound fracture of tibia and fibula. Showing plate. (Cornett.)

the screw in a jaw devised for the purpose until it is fixed in its drill-hole. Such an instrument I exhibit.

As to the simple fractures which require treatment by immediate operation, all such as present an irreducible deformity so great as manifestly to interfere with function, even though union take place, should be treated through an incision. This rule applies to every accessible bone in the body.

E. V. Fracture of surgical neck of humerus. After wiring. Result bad. (Surgeon unnamed.)



Fracture of astragalus, with subluxation. Crippled ankle.

The fractures which most commonly require open treatment are those of the patella, olecranon, clavicle, the humerus, particularly its extremities, femur, the tibia, and fibula.

It is probable that in fracture of the anatomical neck of the humerus, or of the head or neck of the femur, or of the astragalus, excision will give better results than any of the operative methods of apposition thus far proposed.

In fractures of the malleoli, provided they be uncomplicated by injuries of the tarsal bones or chipping of the articular surface of the tibia, complete reduction and retention are readily accomplished, and the functional results are admirable.

It is probable that all the cases of hopeless crippling which follow injuries diagnosed as malleolar fracture are in reality due to injury to the astragalus, os calcis, or articular extremity of the tibia, thus allowing such alteration in the plantar arches or the application of the body weight to them that atrophic changes and pain and tenderness on use are progressive. That some of these cases might be benefited by suturing operation seems probable, though I am not aware that this procedure has been practised, excepting for the cure of fracture of the greater tuberosity of the calcaneum.

The operative measures devised and practised for the cure of fracture of the femoral neck

seem, from the purely mechanical standpoint, inadequate, nor do the clinical results of these procedures justify their acceptance upon the part of the profession. Perhaps the commonest method of coaptation is to drive a nail or screw through the base of the trochanter into the neck and head of the bone, in the hope that thus the fragments may be held in their normal relation one to the other till healing takes place. The soft structure of the femoral head and neck affords but a feeble hold to an instrument thus driven into it, and one totally inadequate to combat the tendency to shortening, angulation, and rotation incident to the action of the powerful pelvic and thigh muscles. If approximation and retention are to be accomplished by instrumental means, it must be through the agency of a screw at least six inches in length, entered two inches below the trochanter, driven up through the neck and head of the bone and into the pelvis while the fracture is completely reduced under ether.

Ruth and Whitman have, however, so clearly demonstrated that union in good position may be secured by proper conservative treatment of these fractures, that the profession is likely to be less concerned with their open treatment than in the past.

As to the selection of the individual method of holding bones which cannot be placed in proper relation to each other without operation, the incision should be a free one, and should be made as soon after the infliction of the injury as it can be determined that reposition is possible by no other method. This insures the clearing away of blood-clots, which are often factors in increasing separation and preventing reduction.

Comminuted fractures of the shafts of long bones is best secured by wrapping with silver wire, supplemented by the application of screws or silver plates. There seems no reason for the sacrifice of any fragment which can be reduced and retained in accordance with the mechanical requirements of the case, in the absence of devitalizing lesions of the soft parts.

In oblique fractures, two screws driven in at right angles to the line of fracture, of such length as to pass completely through the bone, should prove adequate. The apposition may be made still firmer by one or two encircling gut or wire ligatures.

In transverse fractures of the shafts of the long bones, the silver plate has its chief applicability.

In fractures involving joint surfaces and the soft structures of ends of bones, the catgut or wire suture would seem most serviceable. Intercondylar fractures may be best treated by the application of a rod provided with a nut at each end, such as I exhibit. In one such case I transfixed with silver wire and maintained apposition by lead shot clamped in place when the broken bones were brought in apposition.

As to the preparation for the open treatment of a fracture, the surgeon should be provided with rubber gloves of extra thickness, with screws of varying length, cylindrical or very slightly conical, and threaded to the head; with either an electrical or foot engine, which will enable him to apply his drills with accuracy and the expenditure of a minimum amount of force; with drills adapted to the varying diameter and length of the screws to be used; with clamps or forceps which will hold the bones in accurate apposition; with wire of adequate tensile strength and varying sizes; with a screwdriver which can be easily manipulated and which holds the screws until they are well started; and with silver plates.

A more important provision than any of these is a thorough training in cleanliness on the part of the surgeon, a realization of the disastrous results which will almost certainly follow infection, and the avoidance of an operation until such time as not only the proper tools, but also trained assistants and a well-organized aseptic technique, can be provided. The open treatment of simple fracture cannot be regarded as an emergency operation.

Special screwdriver. (See page 268.)

SOME EXPERIENCES IN THE OPERATION OF THYROIDECTOMY, PARTIAL AND COMPLETE[1]

By FRANCIS J. SHEPHERD, M. D., C. M., F. R. C. S. Eng. (Hon.)

MY first operation on the thyroid was in 1883, my next in 1889, and in both cases enucleation of the tumor, which, as usual, was on the right side, was performed. In each case the tumor was cystico-colloid in character. At this time I was much influenced by the work of Professor Socin, who advocated enucleation of the tumor in preference to excision of part of the gland itself. The advantages claimed for this method are: 1. Rapidity and comparative bloodlessness of the operation; 2. The fact that only the diseased portion of the gland is removed, so that no danger can be feared of such after-results as cachexia strumipriva, etc.; and 3. The comparative safety of the method and the absence of risk of wounding the recurrent laryngeal nerve.

In my first twenty-five cases I practised no other method for simple cystic and adenomatous goiters, and was delighted with the good and speedy results. But, alas! a case of secondary hemorrhage occurred, which nearly lost me my patient; and a little later another patient had secondary hemorrhage, which almost terminated her existence, and had not the cavity been immediately opened, the blood-clot removed, and the inside packed with gauze soaked in a tincture of iron, a fatal result would have ensued. These two cases alarmed me, and after this I rarely enucleated the tumor, except in cases of simple cysts, but removed the half or all the gland which contained the tumors. Another reason for my abandoning enucleation as a routine method was the fact that in some cases I had recurrences of the cyst or tumor, and the operation had to be repeated.

About 1897–98 I commenced to remove more frequently the whole or part of the thyroid. Simple cases now I did not see so often, but the large solid growths with difficult respiration and perhaps swallowing, with nervous symptoms and rapid pulse beginning to appear. I was really forced to give up enucleation, because, as I said, now more difficult cases were sent me; the simpler ones were treated elsewhere.

PARALYSIS AND INJURY OF NERVES

In the twenty years and more during which I have operated on enlarged thyroids (in the neighborhood of one hundred cases) I have only once cut the recurrent laryngeal nerve, and in this case the tumor was of enormous size, and had been treated in England by the actual cautery and the plunging in of pieces of caustic potash, so that there was much cicatricial tissue. In this case no harm resulted, for the other nerve was intact. The nerve was sutured immediately, and in a few months recovered its function. In another case, where there was existing paralysis of the left nerve, and the tumor was of large size, in fact where the disease was so extensive that the whole gland had to be removed, just as I was sewing up the wound a spurt of blood came from the right side of the larynx, and I seized the bleeding-point with a pair of artery-forceps; immediately the breathing became noisy, expiration was easy, but on inspiration there was aspiration of the cords and a peculiar inspiratory whistle produced; inspiration was so difficult and breathing so labored that tracheotomy had to be performed (the forceps had been removed as soon as the peculiar breathing appeared). After a week, voice was partially recovered, the tube removed, and in two weeks she left the hospital with as good a voice as before she entered it. In this case the left cord was paralyzed, and I probably seized some small branch of the recurrent going to the abductors, so the adductors had nothing to oppose them and the rima was closed.

It is quite common in large thyroids to find paralysis of one cord. I have never seen paralysis of both, but one cord is not uncom-

[1] Read before the American Surgical Association, Cleveland, Ohio, May 30, 1906.

monly paralyzed from pressure, either partially or wholly, and atrophy may cause the loss of function. In my experience the left cord is most commonly affected, and this occurs especially when the largest growth is on the right side. It is always important that the larnyx should be examined before operation, for if one cord is paralyzed the operator will necessarily be more careful not to injure the nerve of the other side. In cases where one cord is paralyzed, the cord of the other side may move over to the affected side and so compensate, and very little change will be noticed in the voice, except that the patient tires easily on talking. In some cases there is merely irritation of the nerve. This produces fits and spasms of coughing, and especially is this so on any unusual exertion.

In all cases of cord paralysis it is the abductors that are first affected. After the removal of the tumor, the nerve partially or completely recovers its function. Where the cord has been immobile for months, a few days after removal of the tumor it begins to move, and in a month has recovered a considerable portion of its former function, provided, of course, the paralysis is a pressure paralysis and no atrophy has taken place.

HEMORRHAGE

I have had a few cases where there was considerable hemorrhage due to tearing of large veins on the surface of the tumor. If the bleeding is very free, it is a waste of time to try and secure the bleeding veins by forceps, for the veins are so friable that the more they are seized, the more they tear and the greater the bleeding. In such cases I rapidly turn out the whole gland of that side and secure the superior and inferior thyroid arteries; then the bleeding ceases; in fact, as soon as the gland is turned out, the vessels can be seized and hemorrhage stops, and the rest of the operation is simple. In a case of cystic thyroid, which afterwards proved to be malignant, in trying to enucleate the largest cyst it was accidentally broken, and the most frightful hemorrhage ensued, almost as if I had broken into a large venous sinus. The rapid delivery of the whole gland and the securing of the vessels enabled me to arrest the hemorrhage before a fatal result ensued. Salines had to be injected, and finally a good recovery was made, but a few months afterwards the patient died of malignant disease, which had involved the lungs.

ANOMALOUS POSITION OF THE GLAND

In two cases, sisters, where the breadth of the goiter was greater than its depth, the gland was shaped like a huge pair of horns, the end of each cornu almost touching behind and surrounding the trachea and œsophagus. The dissection of the upper horns was difficult. In this form of "circular goiter" there is nearly always difficulty in breathing and swallowing. In another case of left-sided goiter in an elderly woman, she demanded the operation because she had such great difficulty in swallowing. On operating, I found the trachea pushed to the right, and the œsophagus coming over the left side of the tumor and quite superficial; the tumor appeared to have grown to the left side, between the trachea and œsophagus. After removal of the tumor, the œsophagus for some distance was quite free, for it had been dissected away from the tumor, and it seemed to be much too long for the neck when freed from the enlarged thyroid. However, in a short time swallowing was performed as easily as ever, and the patient went home well in ten days.

Cases where most of the tumor is retrosternal are often very difficult, the separation of the gland from the large inferior thyroid veins being a matter of some difficulty. In one case nearly the whole transverse innominate vein was exposed. In these cases there is danger, when secondary hemorrhage occurs, of bleeding taking place into the mediastinum.

I have had only one case of accessory thyroid, and this was beneath the left sternomastoid, and it was affected with malignant disease.

In some cases of enlarged thyroid, owing to inflammatory adhesions, there is difficulty in dissecting out the gland; the tumor does not "shell out," as is usually the way, but has to be actually dissected, thus prolonging the operation and increasing the risk.

INDICATIONS FOR OPERATION

The indications I have considered to justify operation in simple goiters are: 1. Progressively

increasing size of tumor; 2. Rapid growth, with dyspnœa on exertion or when bending forward, attacks of difficult breathing coming on paroxysmally; 3. Narrowing of trachea; 4. Difficulty in swallowing; 5. Alteration of voice; 6. Tachycardia and nervousness, coming on perhaps after years of no inconvenience, caused by the enlargement; 7. Inconvenience and deformity, due to the size of the growth.

Billroth was of opinion that no operation should be performed after forty, unless there was malignant disease. This I cannot agree with.

ANÆSTHESIA

When I first commenced operating I used chloroform, but a death occurring in the practice of one of my colleagues from this anæsthetic, I changed to ether. I found this anæsthetic caused so much venous congestion, and so much mucus collected in the throat, that for several years past I have used a mixture of ether and chloroform with good results. So far, I have had no death and no alarming symptoms from general anæsthesia, and have not felt inclined to adopt local anæsthesia. I have tried to induce patients to be operated by local anæsthesia, but usually before commencing the operation they have begged for ether or chloroform. Most of the advanced cases are very nervous, and operating under local anæsthesia is not the most agreeable thing, either for the operator or the patient. I, for my part, feel much more comfortable when the patient is unconscious. Before operating I induce full anæsthesia, and towards the end of the operation do not require or desire such profound unconsciousness. In these cases I think it very important not to handle the recurrent nerve or to pull on it. This, on one occasion when I was helping a colleague, caused considerable shock, and death ensued, which was attributed to the anæsthetic. I think the danger from general anæsthesia has been much exaggerated, and with care on the part of the operator and the anæsthetist, I do

Fig. 1. Symmetrical enlargement of gland. The upper cornua almost meet posteriorly.

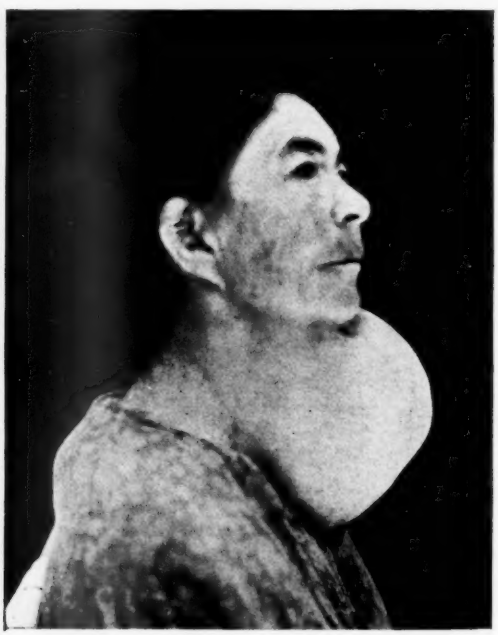


Fig. 2. Enlarged gland in woman aged 60. Tumor grew between trachea and œsophagus, the latter being superficial.

Fig. 3. Case of malignant disease of thyroid. Recurrence in the lung some months after removal.

Fig. 4. Enlarged thyroid, cystico-colloid in character, lasting for years. The left cord was paralyzed.

not think much risk is run. I am sure in a few years all thyroidectomies will be again done under general anæsthesia.

MALIGNANT CASES

During the past twenty years I have operated on seven cases of carcinoma, and all but one have died; this one I operated on no fewer than three times; the last time some four years ago, for recurrence of the disease in the glands of the neck. On this occasion I took everything away on that side of the neck, including the carotid artery, jugular vein, and vagus nerve. After the second operation she developed myxœdema, and has now to be constantly fed with thyroid. She is in excellent health and shows no sign of recurrence. In two cases in which I operated to relieve swallowing and breathing, the patients lived only a short time after operation. In another case there was an enormous cyst, which was removed, filled with blood. The man made a rapid recovery, but a few months afterwards began to spit blood. The cyst was now examined microscopically for the first time, and found to be cancerous, though, at operation, from the clinical appearances there was no suspicion of malignant disease. The man died a short time after this, from cancer of the lung.

I quite agree with Bloodgood, who holds that when carcinoma infiltrates no cure follows extirpation, and he further advises a very wise procedure, namely, that every asymmetrical enlargement of the thyroid in individuals over thirty years of age should be subjected to operative removal. In this way carcinomatous tumors are removed at periods when, clinically, they cannot be differentiated from simple cysts or adenomata, and in this way the removal of an apparently innocent growth may be an early extirpation of a carcinoma. Köcher says, and I can corroborate his state-

ment, that if the patient has suffered from a simple goiter for many years, a sudden enlargement may indicate the possibility of malignant change, and operation should at once be performed. This sudden enlargement may be due to hemorrhage.

MORTALITY

Before the days of antiseptic surgery the operation of thyroidectomy was looked upon with dread, and the mortality was very high, from sepsis, hemorrhage, and pneumonia, also tetany and myxœdema. With the introduction of modern antiseptic surgery and improved methods for arresting hemorrhage, the mortality in cases of simple goiters has been reduced to a very small percentage. Köcher had no mortality in 272 consecutive cases; Krönlein, in 200; Roux, in 526 operations, had a mortality of 11.27 per cent; and von Mikulicz, in 151, had 2.6 per cent. Reverdin's statistics of 6,103 operations gave a mortality of 2.88 per cent; the cause of death being, from operation, 93; suffocation, asphyxia, or pneumonia, 42; hemorrhage, 19; wound infection, 13; wounds of laryngeals, 9; syncope, 4; myxœdema and tetany, 4. I have seen one case of pneumonia following operation, but the patient recovered.

Fig. 5. Same as Fig. 4. Showing the curved incision used in cases of very large thyroid. Photograph taken a week after operation.

METHOD OF OPERATION

I have always used the vertical incision to remove thyroids. In very large ones I extend the incision in a curved manner, with the concavity upwards to the opposite side, a little above the suprasternal notch, but in ordinary cases a longitudinal incision along the inner border of the sternomastoid muscle I have found quite sufficient. The transverse incision

I have tried and given up. I do not find it as convenient as the vertical.

After tying all superficial vessels and cutting through or pulling aside the omohyoid, the gland is come down upon; I now clear the upper end, ligate the superior thyroid artery and vein, and then deliver the tumor, the freeing of the upper cornu making this much easier. I now look for the inferior thyroid artery, secure it before it divides, and then look for the recurrent nerve, which is usually easily found running up the side of the trachea; the branches of the artery and the middle thyroid veins are now tied and cut internal to the nerve, and the inferior thyroid veins also secured and cut, and the gland separated from the trachea, the isthmus secured with a Köcher clamp and then tied off. If the whole gland is to be removed, the opposite side can be easily turned out through the same incision, and the vessels secured as before, the removal of the largest half facilitating the enucleation of the other. The wound is closed, after all hemorrhage is controlled, with horsehair sutures, and a small drainage-tube or cigarette drain introduced; this is left in twenty-four hours. Since giving up subcutaneous sutures I now rarely see keloid.

When the fascia has been cut through and the muscles separated, it is of the utmost importance to recognize the capsule of the gland, its peculiar bluish red color, with numbers of small and distended veins running over it, making it possible to identify it, and with practice it is easy. It is important not to cut into the capsule, for if this be done, profuse and often alarming hemorrhage occurs. In separating the tumor, great care is necessary; I prefer my finger, but some use a blunt instrument. I never, as I said before, deliver the tumor before tying and cutting away the superior thyroid vessels. It is most important to secure the inferior thyroid artery immediately after delivery of lower part of gland.

High temperatures after operation are common, 60 to 80 per cent; thought to be due to too great handling of the gland. Difficult breathing after operation ought to be carefully inquired into; it may be due to hemorrhage, accumulation of mucus, too tight dressings, and also the packing enlarging, owing to its becoming soaked with blood or exudate. Pneumonia may follow operation, though I have seen only one case. There is usually painful deglutition after operation, but this soon passes off.

It has been my habit, when the disease involves the whole gland, to leave a small portion which lies on the trachea near where the superior thyroid artery enters, but sometimes I have not been able to leave any part of the gland, and yet in only one case have I seen myxœdema follow operation. In many cases of large multilocular cysts I tied and cut away the superior thyroid vessels, then delivered the gland and enucleated the tumor. This leaves a thin layer of gland tissue behind, and there is no danger of injuring the recurrent nerve. Sometimes I tie the inferior thyroid as well. It is astonishing the facility with which the tumor is shelled out by this method, and of course with no hemorrhage. I sometimes pack the cavity for twenty-four hours with iodoform-gauze. This I have found beneficial; it precludes the danger of hemorrhage, and I think lessens the tendency to thyroidism. I occasionally use a drain only, cigarette or rubber, and never close the wound entirely. I always remove the drainage and packing on the day after operation.

I have never yet lost a case of simple goiter, but two exophthalmic cases have died. I have had only one case of myxœdema following excision of the whole thyroid, and this was the case of malignant disease, mentioned above, which recurred. The dangers of the operation are known to you all — shock, injury to the recurrents, hemorrhage, infection, pneumonia, heart failure, etc. In only one case have I had to perform tracheotomy, and the tube was removed in one week, the patient recovering as related above.

As I intend shortly to read a paper on the surgical treatment of exophthalmic goiter, I have not mentioned my experiences in this form of goiter.

SURGERY OF THE LARGE INTESTINE[1]

By GEORGE E. ARMSTRONG, M.D., Montreal, Canada

THE primal question in malignant disease of the large intestine to which I wish more particularly to refer is that of its early recognition. Here, as in other regions, the lowering of the immediate mortality rate, and the securing of greater freedom from recurrence, is to be made rather in the development of ways and means for its early recognition in its incipient stage than in devising heroic operative procedures.

The earlier indications may be observed in a cancerous anæmia or cachexia in one group of cases; while in another, weight, discomfort, or constipation may be the first sign of any departure from the normal state of health. The remarkably good general condition sometimes present in advanced disease has been noted, but no explanation seems to be forthcoming for it, so far. The onset of anæmia in a person at or beyond middle life should be, in itself, a sufficient stimulus to a careful search for a probable cause. In malignant disease, in addition to the usual syndrome, it is coming to be recognized more and more generally that there is, I think I may say in the great majority of cases, a certain amount of temperature. If it can be established, as I think it can, that a daily range of temperature from 98° to 100° is as regular an accompaniment of malignant growth and its resultant toxæmia (even before the growth has broken down and presented a surface denuded of epithelium, and more or less adapted to absorbing), we may have a sign which may be of as much value in detecting the early stages of malignant growth in the large intestine and in other situations as a similar abnormal range of temperature is in incipient tuberculosis. I think that presently we may find evidences in the blood that may prove to be of material assistance. The work of A. E. Wright suggests visions of great possibilities for the future in diagnosis and therapy.

The symptoms proceeding from the local condition, even in the earliest period, seem necessarily associated with narrowing of the bowel. Pain of a colicky character associated with constipation, and frequently recurring, makes a symptom-complex, referred to by Nothnagel as indicative of disease in the large intestine. Many of these patients have told me that their stools did not give the usual sense of comfort. They did not feel as if they had finished. In the presence of these suggestive symptoms, I believe that a careful and methodical search would discover a tumor in a larger number of cases than has been hitherto suspected. Malignant tumors of the large intestine are generally sensitive, but sometimes indeed most surprisingly insensitive. If carcinomatous, they are, as a rule, hard, stony hard. To this, however, I have recently had under observation a striking exception in the presence of a large soft tumor of the descending colon, not narrowing the lumen of the gut appreciably, and reported by the pathologist to be adenocarcinoma. Sarcomata, of course, are generally larger and softer. The search for these tumors should be methodical, and not considered complete until the patient has been examined on more than one occasion, and in the upright as well as in the recumbent position. A distinguishing feature of these tumors is their mobility. They may lie under the liver or under the spleen, so that they may not be detected with the patient in the recumbent position, and yet become apparent when the patient stands up; or they may be discoverable one day, and on the next be impalpable in any position that the patient may assume. Their most characteristic feature is their extreme mobility under the hand, and this sign is always present, unless they have formed adhesions. Visible movement is sometimes present during forced inspiration and during peristalsis. The mobility is particularly marked, of course, in the transverse colon and sigmoid. In the examination of the blood, in the daily variation of temperature beyond the normal limit, and in the frequently recur-

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ring colicky pain associated with constipation, we have a most suggestive group of symptoms, sufficient, if persistent, in doubtful and progressive cases, to justify if not demand an exploratory incision. If the tumor can be felt, the diagnosis is complete.

I think we should impress upon our students and upon the profession, upon every possible occasion, the extreme significance of the three losses — weight, strength, and color — occurring in people at or beyond middle life.

I do not purpose to enter at all fully into the treatment of malignant disease of the cæcum, colon, and sigmoid; but upon one or two points I should like to express views which I have come to hold pretty strongly. First, as to the procedure to be adopted in the presence of acute intestinal obstruction secondary to malignant disease. As was well said by Barker in speaking of these cases, "the surgeon's judgment may be taxed even more severely than his skill, although both may be equal to many other emergencies." These patients are often seen by the surgeon for the first time when the abdomen is considerably distended, vomiting present, the vomitus having a fæcal odor, pulse rapid and of poor quality — evidences not only of obstruction, but also of toxæmia. The site and nature of the obstruction may be indeterminable except by exploratory incision. In these cases an incision in the median line below the navel is necessary to determine the seat of the disease. Under no circumstances should one be persuaded in these cases to do more than give relief to the immediate condition of toxæmia, and empty the intestine of large quantities of septic matter, by an appendicostomy or an appropriately placed Paul tube. The resisting power of these patients is low, the toxæmia is generally greater than is apparent, and their strength is, as a rule, over-rated, with a subsequent surprise at their early collapse. In addition to a considerable degree of toxæmia, the bowel-walls are often sodden, friable, and more or less paralyzed. Operation here should be clearly restricted to the relief of the obstruction and drainage of the bowel above the obstruction. One should never allow his better judgment to be over-ruled by a desire to do a nice surgical operation. The next lesson that my experience has taught me is that a colotomy should be a last resource. It is a dirty operation, and, particularly during the first few weeks, when done for an acute obstruction, renders the patient more or less of a nuisance in the ward, and a burden to himself, and, furthermore, increases the danger of subsequently entering the abdomen to remove the growth.

For the radical removal of the cause (a procedure of more than usual hazard after a colotomy, because of the difficulty of getting the abdomen-wall thoroughly sterile) we have the choice of two procedures, which, I think, should be adopted in all cases where the general condition of the patient and the condition of the intestinal walls permit. First I would place short-circuiting. This permits of the removal of the growth at the same time, if the condition of the patient justifies it. If not, the abdomen may be closed, and when the intestines have emptied, and the patient has recovered from the toxæmia, the growth may be removed at a second operation. This procedure is clean and safe.

Short-circuiting, to be done with safety, demands room to work and moderate intra-intestinal tension. Mechanical obstruction and distention are not, in themselves, insuperable bars if the general condition is good, and the walls of the intestines are unaltered and in a condition to bear safe suturing. The distention may be overcome by withdrawing a convenient loop, and, under proper safeguards, emptying the bowels of a large part of their septic contents, aided, if necessary, by intestinal lavage. Stomach lavage, and intestinal lavage through an opening in a prominent loop, may render an otherwise difficult lateral anastomosis easy and safe. As a rule, stomach lavage materially improves the patient's condition. Exceptions to this rule occur occasionally. Just recently, a man was admitted to my ward in the Montreal General Hospital with a history that indicated that he had had incomplete intestinal obstruction for three days, and complete for two; stercoraceous vomiting for forty-eight hours; rigidity and distention present; and the pulse weak and rapid. Stomach lavage, which was done immediatly after anæsthesia was induced, was followed by a condition of collapse.

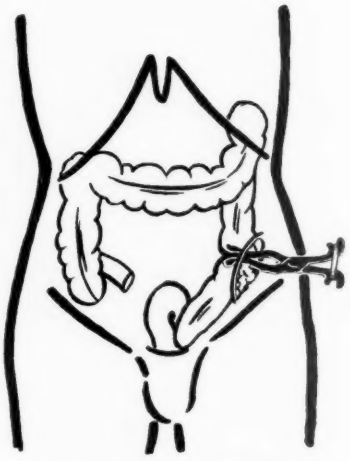

Fig. 1. Lateral anastomosis by Mikulicz's kentrotribe.

One of my colleagues had a similar experience. Fortunately, such instances are but rare exceptions to a very general rule.

If it is thought that the patient cannot bear even so long an operation as is required in a lateral anastomosis, or the intestinal walls are too sodden and friable for safe suturing, the growth may sometimes be delivered outside the abdominal wall and there anchored. A Paul tube can then be inserted into the proximal end on the proximal side of the growth, and the growth be removed later on. The intestinal canal can be subsequently restored by a lateral anastomosis, made by Mikulicz's kentrotribe. This proceeding may be regarded as safe, but it is not ideal. It is open to the objection of a colotomy wound, and in the removal of the growth at a subsequent time, no opportunity is offered to remove the glands. Its rapidity and safety are its chief commendations.

The short-circuiting operation has been objected to by Bidwell and others, on the ground that the second operation for the removal of the growth is rendered difficult by adhesions. I do not think this objection should have very great weight. The adhesions are often trivial, and, generally, are easily separated. Two great advantages of this method are: 1. That the patient is clean from the first; and 2. At the second operation one enters through a clean abdominal wall when the patient is thoroughly recovered and in good condition, and one then has an opportunity of removing the lymphatic glands, thus giving very much greater freedom from recurrence. If, however, only a colotomy is possible, I believe the advantages of a Paul tube to be very considerable. It remains in situ six or seven days, during which time a very fair union takes place between the abdominal wall and the intestine, and with care no infection should occur between these surfaces.

When operating at a time of election for the removal of malignant growth, I should say that a colotomy should never be done but for a fixed irremovable growth in the pelvic colon. In the case of an irremovable growth situated above the sigmoid, an ileosigmoidostomy possesses every advantage; it is safe, and should be preferred to colotomy. It goes without saying, that the canal should be restored in all cases, when possible, after the removal of the growth. The relative merits of an end-to-end or lateral anastomosis depends somewhat upon the situation of the disease. It may be said, however, that safety of end-to-end anastomosis obtains only in the transverse colon and sigmoid, which are generally completely surrounded by peritoneum.

Cancer of the rectum is more common than that of the sigmoid. Malignant disease is

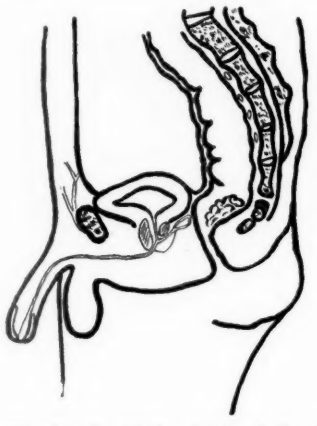

Fig. 2. Showing the relative levels of the disease in high carcinoma of the rectum and the peritoneal pouch. The impossibility of thoroughly removing the disease without opening the peritoneum is apparent.

here only too often well advanced before its nature is discovered, and there would seem to be less cause for delay, because in nearly the whole of its extent it may be palpated with the examining finger. As elsewhere, there should be a method in examining the rectum, and in every case where the symptoms are sufficiently suspicious to justify an examination at all, the examination should not be considered complete until the whole of the upper part of the rectum is carefully and thoroughly palpated. I think it was Leube who first drew attention to the association of piles and carcinoma of the rectum, and expressed the opinion that often the swelling of the hemorrhoidal veins was due to the carcinoma. Nothnagel elaborated this view somewhat, and states that suspicion of carcinoma of the rectum is very much more probable when constipation and hemorrhoids come on more or less suddenly in a person who was previously quite regular. The harmless form of hemorrhoids usually develops as a result of prolonged and persistent constipation. The extreme importance of a thorough examination of the whole length of the rectum in every case of hemorrhoids or rectal distress cannot be unduly emphasized.

The unsatisfactory results hitherto obtained in carcinoma of the rectum have been due primarily to tardiness in its recognition, and secondarily, to the method adopted in its treatment. Of the operative treatment of carcinoma of the ampulla, I will not speak, but shall confine my remarks to high carcinoma of the rectum, by which I mean carcinoma situated from 5 to 9 cm., or 2 to 3½ inches, above the anus. The mortality has so far been high and recurrence frequent. The disease should be removed with at least one inch of healthy gut above. One must be prepared to find the reflection of the peritoneum within 2½ inches of the anus, opposite the first coccygeal vertebra. It follows, therefore, that high carcinoma of the rectum cannot be removed as it should be without opening the peritoneum. This is not, however, the whole problem. Freedom from recurrence here, as elsewhere, can only follow complete removal of the whole diseased area in its entirety, and with it the lymphatic glands within reasonable limits. I have for many years taught that the

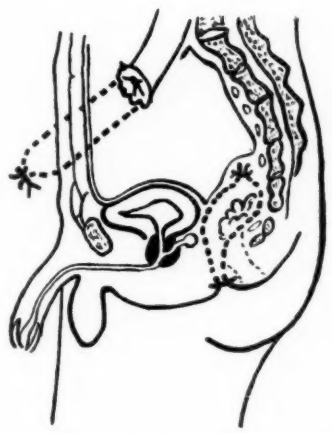

Fig. 3. Abdomino-perineal method. The gut divided well above the disease, and the glands removed through the abdominal incision. The diseased area is then pushed down by blunt dissection. The pelvic opening closed by approximating peritoneal folds, and the abdomen also, after upper end of gut is brought through colostomy wound. Lower end then removed through perineum.

word "recurrence" is unfortunate. It is a term that covers a multitude of sins. It is a breakwater behind which we are all glad at times to take refuge. The word that the operating surgeon should ever have in mind at the operating-table is "continuance." An operative method, to be not only efficient, but sufficient also, should give access to at least the level of the fifth lumbar vertebra. Nothing less is sufficient for the removal of a malignant growth, the upper limit of which can just be reached by the examining finger. I think that I can safely say that the perineal route has been tried and found wanting.

Of the different methods of approach from behind, through the sacrum, one must speak more guardedly. By this method I have had some fairly good results. In one case the proximal end of the gut was brought down and twisted, as recommended by Gursuny. The patient left the hospital in good condition, and I have never been able to get track of him since. In one other, I brought the proximal end out between the lower fibers of the glutinous maximus muscle, as suggested by Witzel and Rydygier. Two years later this man was well, had fair control and comparative comfort. In two cases I joined the ends, the

upper to the lower. In both, very careful preparation had been made. The bowels had been most thoroughly emptied daily for ten days. In one I had taken the additional precaution of doing a preliminary colotomy, yet in both leakage occurred; in one proving fatal, from infection and sepsis occurring locally; the other made use of the colotomy wound permanently. Convalescence in both cases was slow. It may be said of the sacral operations that they give good access and are comparatively bloodless. On the other hand, they leave a large space difficult to protect from infection, and which, once infected, becomes a source from which septic absorption readily takes place, and which is very slowly obliterated. Convalescence is prolonged, and sinuses and fistulæ may persist indefinitely.

I am satisfied that a combination of the abdominal and perineal methods gives promise of better results in high carcinoma of the rectum and pelvic colon than any other method of which I have had any experience. It may be that it is right occasionally to do as I did in a case recently operated upon. In making a preliminary examination, I could get well above the disease; it was not at all adherent in front, and was fairly movable behind; so much so, that I felt that I could bring the disease down and get well above it by the perineal route, and in this I succeeded. The mesorectum, however, was so thickened and indurated, that I could not bring the proximal end down to the lower, nor could I bring it down without tension to the level of the skin through the notch. I therefore opened the abdomen and did a left inguinal colotomy with a Paul tube. The colotomy wound was absolutely perfect; complete primary union all round, without a drop of pus. I attached a large rubber drainage-tube to the proximal end in the pelvis, and brought it out through the anus. This kept the perineal wound clean until the tube came away on the eighth day, by which time the surface was more or less granulating and less absorbent. This patient has made an uninterrupted recovery; his temperature scarcely going above 99° and his pulse remaining about 80. He was out of bed on the tenth day, eating and sleeping well the whole time. Of course, he has a permanent colotomy wound, but I think this is as well taken care of as one situated behind. The disease proved to be adenocarcinoma. The uppermost of the glands removed were not infiltrated. The gut between the colotomy wound and the point of division below remains permanently. This method can be carried out without exposing the peritoneum to infection.

When the growth is situated a little higher, opposite to the third or fourth sacral vertebra, two or three procedures present themselves for consideration. In one instance, after I divided the gut an inch below the growth, there remained, after closing and infolding the lower end, about an inch on its anterior surface, covered by peritoneum. This was too small a surface, especially so, situated as it was low down in the pelvis, to permit an anastomosis by suture, but I thought I could accomplish it with a Murphy button. Unfortunately, perhaps because of my clumsiness, the button in the lower segment slipped away before I had succeeded in locking the two parts together. I then closed the opening altogether, and brought the proximal end out through a colotomy wound. All went well for seven days, when symptoms of peritonitis developed, which ultimately proved fatal. The infection occurred, I think, from the end of the rectum left in the pelvis.

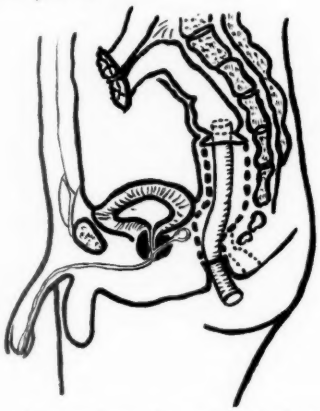

Fig. 4. After excision of growth and glands. Upper end of bowel could not be brought to level of skin. Rubber drainage-tubes tied into upper end, to avoid infection until granulating surface had formed. Tubes came away on eighth day.

My next case was a female, and the disease, adenocarcinoma, was situated about opposite to the third sacral vertebra. Here I removed the diseased area with one inch of healthy gut distal and three inches proximal to the growth, together with all the glands that could be found, and then closed the lower end by infolding, and after pushing it down as far as possible, I closed the peritoneum over it with two rows of sutures, the proximal end of the gut being brought out in the left inguinal region, and a Paul tube attached. This left the peritoneal cavity all closed in and protected from infection. Convalescence here was retarded by infection occurring around the closed end of the pelvic rectum. It was localized, and did not involve the peritoneum.

In my next case the disease was about the same level, i. e., opposite to the fifth and fourth sacral vertebræ. After the growth with a very free margin, about four inches was removed, the peritoneum on the side and anterior surface of the rectum was divided. The pelvic end was closed, infolded, and by blunt dissection carefully separated all round, and together with the vessels and glands situated posteriorly was pushed well down behind the bladder and covered with a pad of gauze. The peritoneum was closed over by suturing the plica semilunaris on one side to its fellow on the opposite side, and the two to the peritoneum behind. The edges of the peritoneum were brought together over the area exposed by the removal of the pelvic sigmoid. The proximal end of the gut was brought out through an opening in the left iliac region, and a Paul tube attached. This left the peritoneal cavity all closed, and with a complete lining of peritoneum. The rectum was then removed by the perineal route. It is an advantage in these cases to leave the sphincter and anus. Convalescence here was ideal.

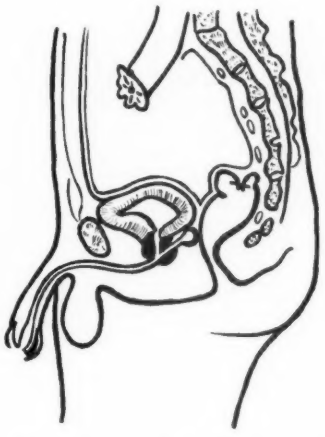

Fig. 5. Diseased area excised. The lower end covered by peritoneum, too short for lateral anastomosis. It was infolded, covered by peritoneum, and upper end brought out through colostomy wound.

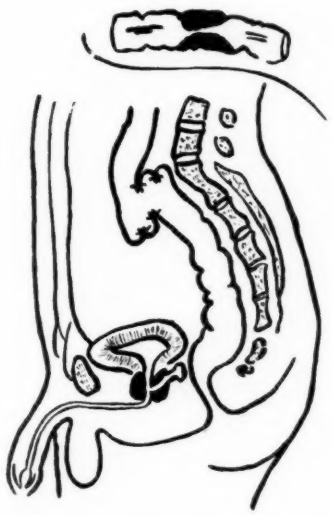

Fig. 6. Intra-abdominal anastomosis between rectum and sigmoid, colon or ileum. Restoring the canal should be practised, where possible.

This combined method I believe to be safest, and followed by a smoother and more comfortable convalescence than any other that I have been able to carry out for disease at this level. It has this advantage (although I have never practised it), that if the patient's condition causes anxiety, the perineal part of the operation can be postponed for a few days. I may say, however, that the four patients upon whom I have operated by the combined method have exhibited no evidence of shock. The unfortunate part is the permanent colotomy. This, it goes without saying, should be avoided when at all possible.

So far as I have been able to judge, however, from watching a number of these people, I should say that a man with an inguinal colotomy is cleaner, more independent of nurse or valet, and altogether more comfortable, than the man with the opening in the sacral region; that the abdomino-perineal method has a lower mortality and a shorter convalescence than the sacral methods; that it affords an opportunity to observe and deal with extension to the peritoneum or bladder; and that an end-to-end anastomosis of the pelvic rectum is impracticable. By the abdominal method, if there is sufficient length at the distal end of the bowel after safe closure and infolding, (and what is sufficient length will depend somewhat upon the size of the patient, the skill of the operator and his surroundings), immediate restoration of the canal should be obtained by a sigmoidorectostomy or ileosigmoidostomy or ileorectostomy. In a lateral anastomosis between two parts of the colon, I like a sew-line of three inches or more, which gives me an effective opening of 2¼ or 2½ inches. Less would do, particularly if the ileum is joined to the pelvic colon.

THE SURGERY OF CARCINOMA OF THE UPPER PORTION OF THE RECTUM AND THE SIGMOID COLON[1]

With Special Reference to the Combined Sacral and Abdominal Operation for the Resection of These Tumors

By JOSEPH C. BLOODGOOD, M. D., Baltimore, Maryland

SUFFICIENT time has elapsed to demonstrate clearly that resection has accomplished a certain number of cures of carcinoma of the stomach and large intestines. In the majority of these cases the hope of future progress depends more upon earlier recognition than upon improvement in operative technique. The technique of gastrectomy for carcinoma is most satisfactory. The only partially settled problem is in regard to the extent to which glandular dissection should be carried. At the present time the majority of authorities favor a restricted glandular operation, in view of the higher mortality of the more extensive dissection and the slight probability of a cure when these more remote glands are involved. With carcinoma of the small intestine there is not sufficient experience to formulate positive deductions. Malignant epithelial tumors, anywhere between the ileocæcal valve to the anus, are of comparatively frequent occurrence. When the tumor is situated in that part of the large intestine above the promontory of the sacrum, the entire manipulation is performed within the abdomen. These tumors, which arise from the mucous membrane of the large intestine, show little tendency to extend beyond the peritoneal coat, except at the mesenteric border. Adhesions due to the infiltration of the epithelial growth through the peritoneal coat into neighboring viscera are late complications. In planning for the complete extirpation of these growths, one should resect a very generous portion of the apparently uninvolved intestine on each side of the palpable tumor, because infiltration of the new growth along the submucosa beyond the open ulcer is a common occurrence. The next most important step is to include with this portion of the bowel a large area of mesocolon, whether the glands be palpable or not.

In selecting the place for the division of the bowel above and below the tumor, one should have in mind not only the complete removal of the tumor, but also a proper blood-supply after the resection of the mesenteric area. The experience of any surgical clinic and the literature show a comparatively large number of cases in which the tumor had every appearance of curability, but in which an operative

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death due to gangrene of one or both ends of the resected intestine marred the result. The decision as to the method of suture after the resection is a somewhat difficult one. As a rule, closure of the two ends with a lateral anastomosis is the safer procedure.

As the tumor of the colon approaches the promontory of the sacrum, new problems arise. In some instances there is sufficient healthy bowel below the tumor to allow resection and suture within the abdomen. In other cases, on account of the lower position of the tumor, or its infiltration analwards, the resection can be completely accomplished only by a combination of an abdominal and extra-abdominal or a sacral incision.

This paper is concerned chiefly with the latter group of tumors.

The literature on this subject, with a complete historical review, appeared in 1904 in the *Deutsche Zeitschrift für Chirurgie* (vol. lxxiii, p. 229) by Ito and Kunika, and by Goullioud and Faysse in *Révue de Chirurgie* (1905, vol. xxxi, pp. 711 and 107). As far as I have been able to ascertain, these two articles cover the most important contributions to the literature.

In the past, surgeons have been concerned chiefly with the extirpation of the affected bowel with a generous portion above the tumor, and below the tumor the extent of the removal has varied from four centimeters to the entire rectum, including the sphincter. In addition, they have made very extensive dissection of the tissue between the rectum and the sacrum.

These surgeons have been content either with an inguinal colostomy or a sacral anus.

In approaching my cases since 1904 I have endeavored not only to fulfill the requirements of a complete removal of the malignant disease, but also to attempt, after its removal, a restoration of the continuity of the bowel by an end-to-end anastomosis.

In my first case, in November, 1904 (case 3), I was able to perform the complete resection of a carcinoma situated just above the promontory of the sacrum entirely within the abdomen. The condition of the patient, however, forbade, at that time, an attempt at suture. At the present writing, eighteen months since operation, the patient is content with the colostomy. In a second case (case 1), in July, 1905, it was necessary to finish the resection through a sacral incision. In this instance it was possible to save, with a good blood-supply, eight inches of the lower end of the rectum, which rendered an end-to-end suture of the sacral wound possible. The result at the present time is unusually satisfactory. In the third (case 2) and most recent case, it was possible to resect and suture entirely within the abdomen.

Compared with the published cases, these three tumors would have received the same complete resection, but with an inguinal colostomy or sacral anus. In two of my cases, complete restoration of the continuity of the bowel was accomplished. In the first case, this procedure would have been attempted had the condition of the patient permitted it.

A careful study of the cases in the literature, I believe, will justify the following criticisms: 1. Colostomy has been performed too frequently as a primary operation. Colostomy is not indicated unless the patients are first seen in a condition of acute obstruction, or their condition is so critical from chronic obstruction that a prolonged operation is contraindicated. If possible, the entire operation should be performed at one sitting. 2. It is unnecessary to ligate the vessels so far from the mesenteric border of the colon. Resection of the glands up to this point is not indicated. If they are involved, my experience demonstrates that the condition is hopeless for an ultimate cure. The disadvantage of ligation of the vessels so far from the colon is due to the fact that, after such a ligation, a more extensive resection of large intestine is necessary to leave bowel with proper circulation. 3. Too much bowel below the tumor is removed.

If one restricts the resection of the large intestine above and below the growth to that necessary only for the complete removal of the disease, and ligates vessels as they are met with in the proper dissection of the mesentery with its glands and the fat between the rectum and the sacrum, it will be possible, in a large number of cases, to restore the continuity of the bowel by an end-to-end suture.

The pathological examination of a number of specimens and of the zone of mesenteric

involvement which I have made apparently confirms the statements in the previous paragraphs. That is, in this somewhat restricted operation the new growth is given sufficient margin, at the same time the circulation of the remaining portion is not impaired, and, in the majority of cases, there may be restoration of continuity.

When the tumor involves the rectum below the promontory of the sacrum, at which position the posterior portion of the bowel has no peritoneal coat, it infiltrates quickly through the wall of the bowel into this tissue. The complete removal of all the tissue between the rectum and sacrum should never be restricted. There is every evidence to indicate that this is accomplished by the combined method better than by the sacral route alone.

Fig. 1. Case 1. Tumor upper portion of the rectum, at promontory of sacrum. T, tumor; B, bladder; S, promontory of sacrum.

DISCUSSION OF CASES

CASE 1. *Pathol. No. 6550. H. R. Adenocarcinoma of upper part of rectum; resection by combined abdominal and sacral route; closure of peritoneum about colon in pelvis; end-to-end suture of colon to rectum in sacral wound; temporary colostomy above; drainage of sacral wound. Recovery. July, 1906, twelve months well; stools per rectum.*

This observation represents the typical combined abdominal and sacral method, with the addition of a successful extraperitoneal end-to-end suture in the sacral wound.

The clinical history was almost, of itself, sufficient to make a diagnosis. The patient was a white male, aged 43, and for one year had suffered from constipation and ribbon stools. The appearance of blood in the stool two weeks ago made him consult his physician, Dr. Humrichhouse of Hagerstown, who immediately, suspecting the nature of the trouble, referred him to surgical treatment.

On examining the rectum with the finger, an obstruction was met about ten centimeters from the anus; it felt something like the cervix of the uterus; the tissue filling the lumen of bowel was hard and granular; it encircled the entire bowel; the mucous membrane ended

abruptly, and no infiltration could be felt beneath it. The tumor seemed movable.

The position of this tumor was one in which, in the past, many surgeons have operated from below by the Kraske method. From my somewhat limited experience I had become convinced that a tumor in this position should at least be first attacked from above.

Operation. The peritoneal cavity was opened to the outer border of the left rectus, the patient placed in a high Trendelenburg position; without difficulty, all the intestines were packed in the upper portion of the abdomen; the exposure of the pelvis and its viscera was most satisfactory. The tumor (Fig. 1) was situated at about the promontory of the sacrum, and but slightly movable, but on palpation there was no evidence of infiltration beyond the wall of the bowel. No glands could be seen or felt in the mesocolon; the ascending colon was withdrawn from the wound and the peritoneal cavity protected with gauze; the colon was clamped just below the lower branches of the ramus descendens (a branch of the interior mesenteric (see Fig. 2, at X); this selection insured a good blood-supply of the upper loop of the colon; the division of the colon was made between two clamps; the divided ends were inverted with catgut reinforced with silk; the clamps were removed. The upper portion of the colon was then pushed back into the peritoneal cavity with a piece of gauze; the lower portion of the colon was pulled farther out of the wound and the division of the mesentery begun. At first the peritoneum on each side of the mesocolon was divided and stripped back; this exposed the fat and vessels; the vessels were clamped about three centimeters from the bowel, first two branches of the sigmoid and a number of branches of the superior hemorrhoidal artery;

Fig. 2. Case 1. Position of division of colon above tumor. X, ligation of artery a short distance below the lower branch of the ramus descendens.

they were immediately tied on both sides; there was no hemorrhage. This left sufficient tissue in the mesentery to include possible metastatic glands. The division of the peritoneum was carried down on each side of the tumor, some distance from it, over the sacrum to the bladder. The division of the peritoneum was not completed between the rectum and the bladder. With a piece of gauze the mesentery and the fat over the promontory of the sacrum were pushed forward and the middle sacral artery exposed, doubly clamped, and ligated; the sacrum was completely stripped of the tissue between it and the rectum. There was practically no bleeding. This completed the dissection from above.

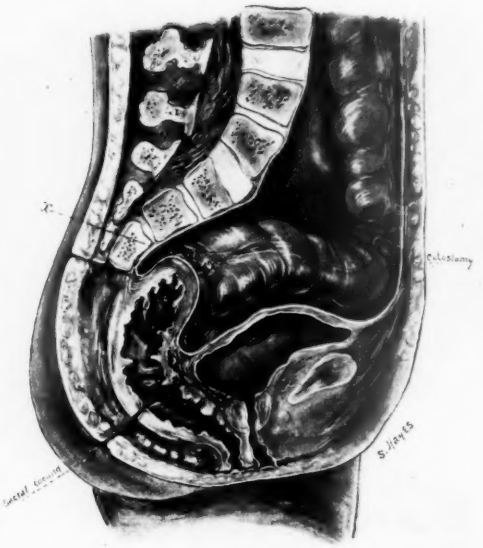

Fig. 3. Case 1. Diagram illustrating relation of parts after operation in case 1. X, suture of peritoneum around colon in floor of pelvis; SS, end-to-end suture of colon to rectum in sacral wound.

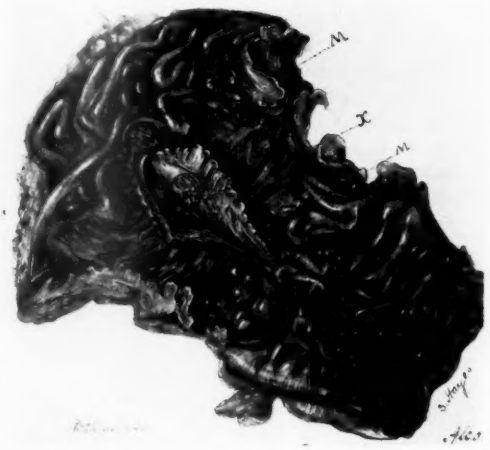

Fig. 4. Case 1. Sketch (pen-and-ink) of bowel removed in case 1. Mucous membrane surface after longitudinal division. M, boundary between mucous membrane and carcinomatous ulcer; X, a longitudinal cut through carcinomatous ulcer.

The patient was then transferred to Halsted's perineal table. A straight incision was made over the coccyx and sacrum; the former and part of the latter bone were removed. The rectum was then divided across eight inches from the anus; the lower portion of the rectum was left undisturbed. As the tumor was situated some distance above the dissection of this lower portion of the bowel below, the tumor was carried rather closely to the wall of the rectum, exposing, in order, the prostate, the right seminal vesicle, and the bladder; the right vas deferens was accidentally divided and immediately sutured. The peritoneal cavity was opened into between the rectum and the bladder anteriorly. These had not been dissected from above. The operator then introduced his left hand into the peritoneal cavity and withdrew the bowel above the tumor. Dr. Sowers, who assisted me, now opened the abdominal wound and pushed the now isolated portion of colon and rectum downwards. As the entire dissection of the bowel from the sacrum had been done from above, this portion of the operation was rapidly performed. The tumor with the portion of the colon and rectum having been removed, Dr. Sowers passed the colon into the sacral wound, where it was held by an assistant, in close proximity to the stump of the lower end of the rectum. The operator then changed gloves and sutured the divided peritoneum in the floor of the pelvis around the colon, closing this portion of the wound absolutely. Dr. Sowers then proceeded to perform a temporary colostomy in the lower portion of the abdominal wound and to close the abdominal wound. The operator at the same time proceeded with an end-to-end anastomosis of the colon and rectum in the sacral wound. The anastomosis was made first with a continuous catgut suture through all tissues, approximating mucous mebrane to mucous membrane. This suture was reinforced with interrupted catgut, approximating the peritoneal coat of the colon to the outer wall of the rectum. Then the divided tissue in the pelvic floor, muscle and fascia, were sutured about the anastomosed bowel, and the sacral wound partially closed with drainage to the suture. (Fig. 3.)

There was no shock following the operation.

Post-operative Notes. The patient required catheterization for about two weeks. A part of the suture in the sacral wound broke down and there was a fæcal fistula. At the end of five weeks, practically all the fæcal matter was passing naturally per anum; there was a small sinus in the sacral wound and in the colostomy, from which there was discharge of gas and some fæcal matter. The patient left the hospital at this time. For a number of weeks the patient irrigated himself through the colostomy wound and through the anus, in order to

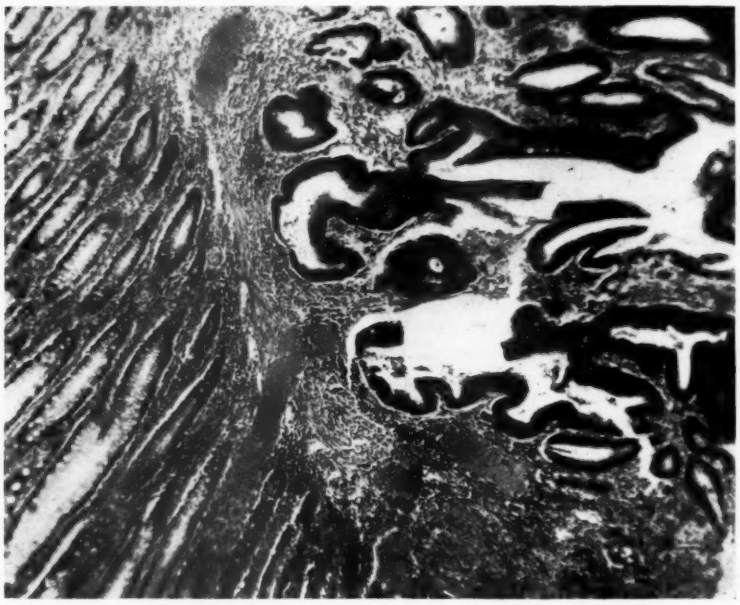

Fig. 5. Case 1. Microphotograph of section through carcinomatous ulcer and normal mucous membrane. M, mucous membrane, slight hypertrophy of glands; X, adenocarcinoma.

evacuate completely the bowel. There was a slight spur formation anteriorly at the position of the anastomosis. Then it was necessary to irrigate the bowel through the anus only.

At the present time, July, 1906, eleven months since the operation, the patient takes one enema daily; the sacral wound has closed; there is a minute mucocutaneous sinus at the colostomy, through which gas occasionally passes; there is no stricture at the position of the anastomosis, and the anterior spur formation is very thin. I believe this can be divided in a few months, when the daily enemas will have become unnecessary.

Pathology. The mucous membrane surface of the superficial carcinomatous ulcer is illustrated in Fig. 4. There was 4 cm. of healthy bowel below and 8 cm. above, measuring from the junction of the ulcer and mucous membrane. The ulcer measured longitudinally 5.5 cm. It was a superficial fungous growth, and in some places had infiltrated to the fat in the mesentery. The enlarged glands show no metastasis under the microscope. Fig. 5 is a photomicrograph from the junction of the mucous membrane and the epithelial growth.

CASE 2. *Pathol. No.* 7335. *Mrs. C. Adenocarcinoma of colon above promontory of sacrum; intestinal obstruction; first operation, median colostomy; second operation, resection and immediate end-to-end suture through abdominal cavity only. Healing, with complete restoration of continuity of the bowel.*

This patient, aged 32 years, was admitted to the hospital on the eleventh day of an attack of intestinal obstruction. In view of the history of an abdominal suspension of the uterus eight years previously, the possibility of an obstruction from adhesions was considered. For one year the patient had had attacks suggesting slight obstruction; constipation, with belching of gas, and distention. However, the recent appearance of ribbon stools and blood were indications of a new growth. The clinical picture suggested an obstruction of the large intestine; the long duration (eleven days), combined with a fair general condition and but moderate vomiting, excluded an obstruc-

tion of the small intestine. A rectal examination, before and during ether narcosis, was negative. Rectal enemata before narcosis failed to get gas or fæcal matter. When the patient was under ether narcosis I passed a rectal tube and withdrew some gas and fluid fæcal matter. However, in spite of this result, it seemed wiser to operate. I have frequently observed this in obstruction from new growth in the rectum or colon. On opening the peritoneal cavity in the middle line, the large intestine was almost of giant size; the transverse colon was U-shaped; the base of the U was adherent to the anterior abdominal wall above the uterus, near the pubes; it was necessary to separate these adhesions and empty the large intestine of its gas and fæcal matter before one could make an exploration; this was easily done without soiling the peritoneal cavity. The opening was made in the transverse colon, at a position which would answer for a colostomy in the upper portion of the median wound. On exploring the pelvis a hard tumor was felt in the sigmoid colon some four inches above the promontory of the sacrum. The patient's general condition contraindicated resection at this time. A temporary colostomy was made in the upper portion of the median wound, because in this position it would interfere less with a second operation on the left side.

The second operation was performed May 26, 1906, about six weeks after the first. The former wound had healed, and it was possible to irrigate the colon thoroughly through the colostomy opening. The peritoneal cavity was opened through the outer border of the left rectus; fortunately, the ascending colon was found collapsed. A number of loops of small intestine, however, were adherent to the mesentery of the ascending colon and splenic flexure. These were separated. The patient was placed in the high Trendelenburg position. On account of the colostomy and the adherent

Fig. 6. Case 2. Diagram of operative findings in case 2. T, tumor above promontory of sacrum: X, line of division of bowel above and below tumor: Lig., position of ligature.

small intestines, it was much more difficult to empty the pelvis and get the exposure noted in case 1. Fortunately, the tumor in the sigmoid colon was situated sufficiently high to allow a resection, giving the tumor sufficient margin through the peritoneal cavity alone. On account of its situation, as shown in Fig. 6, I believe that a more extensive operation by the combined abdominal and sacral route would not have given this patient any greater assurance of a permanent cure than the less extensive resection which I performed. The colon was divided between two clamps at the same position noted in case 1, and following the same method; the lower portion was then withdrawn from the wound, and the mesentery divided, as in case 1, down almost to the promontory of the sacrum; the sigmoid artery was ligated, but not the superior hemorrhoidal. The circulation of the two ends of the colon after the resected loop had been removed was so good that an end-to-end anastomosis was performed. The shortness of the lower loop would have made a lateral anastomosis very difficult. The anastomosis was performed first with a continuous suture of catgut beginning at the mesenteric border. This continuous suture was knotted in five or six places, in order to prevent puckering and a later stricture. Fortunately, the two ends were about the same size, and a perfect approximation was not difficult. This suture was reinforced with interrupted stitches of silk, including all the coats but the mucous membrane, approximating peritoneal surface to peritoneal surface.

Now that the suture was finished, it was a question just what to do. Should the colon be dropped into the peritoneal cavity and the wound closed? Should it be dropped into the peritoneal cavity with gauze drainage? It was found that the position of the suture could be lifted into the lower portion of the wound without tension. In this portion of the wound through the outer border of the left rectus the peritoneum was separated from the muscle by considerable fat; it is a position in which the peritoneum begins to leave the abdominal muscles; the peritoneum can be easily separated; it has a good blood-supply from the fat in the space of Retzius on the median side, and the inguinal canal on the outer side. For this reason it was decided to place the bowel at the

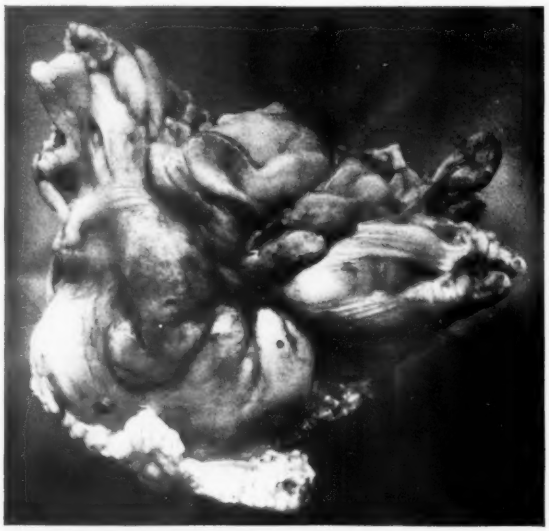

Fig. 7. Case 2. Photograph of fresh specimen. Outer surface of bowel and tumor removed.

Fig. 8. Case 2. Photograph of mucous membrane surface after longitudinal division showing, superficial carcinomatous ulcer.

position of the suture almost extraperitoneal, by pushing the parietal peritoneum back and suturing to the mesentery of the colon on each side of the suture, with gauze drainage to this point; above and below the peritoneum was closed as usual. In a suture of this kind, no matter how carefully it is performed, there is a certain possibility of a leak. The method employed in this case protected the peritoneal cavity most effectively, and if a fæcal fistula were to form, the superficial position of the colon would make this fistula much less dangerous and the probabilities of healing without stricture formation more probable.

Post-operative Notes. For seven days the patient was given by mouth nothing but albumen and water. Fæcal matter appeared in the rectum on the tenth day. At the present time, three weeks after operation, the colostomy wound has almost closed; there has been no leakage at the position of the suture; all the fæcal matter passes per rectum with the aid of an enema; the cavity left after the removal of the gauze drain down to the suture is healing rapidly by granulation; the size of the fæcal matter which passes per anum is sufficiently large to indicate that the lumen of the anastomosis has not contracted.

Fig. 9. Case 2. Painting of specimen in case 2. Section through part of ulcer to illustrate constriction and non-infiltration of tissue outside of wall of bowel.

Pathology. The tumor which produced a constriction of the sigmoid colon is a superficial fungous ulcer. The outer surface showing the contraction is well illustrated in Fig. 7, and the inner surface in Fig. 8. The tumor is an adenocarcinoma of a low grade of malignancy. It has not infiltrated through the wall of the colon, and no involved glands could

Fig. 10. Case 3. Position of tumor just below promontory of sacrum in case 3. S, promontory of sacrum; T, tumor; U, uterus; B, bladder.

be found in the mesocolon. Fig. 9 is a painting of the tumor.

CASE 3. *Pathol. No.* 5907. *Adenocarcinoma of the upper portion of the rectum at the promontory of the sacrum. Colostomy for obstruction in cæcum, later a second colostomy of the transverse colon in the median line, because of a giant colon; third operation, resection through abdomen. On account of the condition of the patient, no attempt at restoration of the continuity of the bowel. June,* 1906, *one year and nine months well.*

Clinically, this case is of interest because of the difficulty of diagnosis. The patient was a white female, 35 years of age. When admitted to the Union Protestant Hospital with symptoms of two weeks' obstruction, her condition was so critical that nothing was done, except a colostomy of the cæcum under cocaine anæsthesia.

This patient gave a history of a palpable tumor in the region of the right kidney for many years; this tumor had been palpated by her physician, Dr. Simmonds of Hagerstown. During the last six months she has had a few attacks suggesting obstruction. The present attack of two weeks' duration has not been complete from the onset; now and then gas and fæcal matter had passed. The distention of the abdomen was so great that the tumor in the region of the right kidney could not be palpated; peristaltic action could be made out. As the distention in the region of the cæcum was unusually marked, and as rectal examination was negative, the possibility of a tumor in the region of the kidney as the cause of the obstruction had to be considered. For this reason the cæcum was exposed. The peritoneal cavity contained bloody fluid; the cæcum was enormously distended with thick walls. The condition of the patient did not allow further abdominal exploration.

About three weeks later, the obstruction having been relieved, the abdomen was opened in the median line; the ascending transverse and descending colon were enormously distended; both kidneys were enlarged, due to a general cystic disease; the right kidney was larger; a hard tumor could be palpated in the rectum, at the promontory of the sacrum. This tumor explained the obstruction, and was undoubtedly a carcinoma. The distended condition of the large intestine and the still weakened state of the patient contraindicated an attempt at resection. For this reason an enterostomy was performed on the upper portion of the sigmoid in the lower portion of the median wound.

The third operation was performed four weeks later. The patient's general condition had very much improved. The details of the operation correspond to that described in case

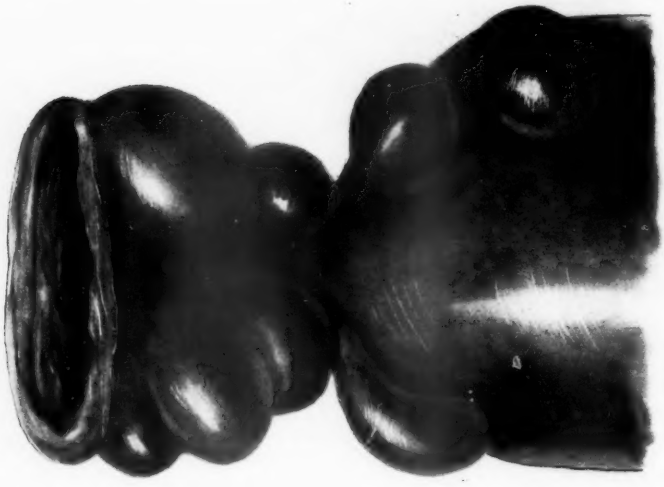

Fig. 11. Case 3. Peritoneal surface of resected tumor and gut, showing stricture in case 3.

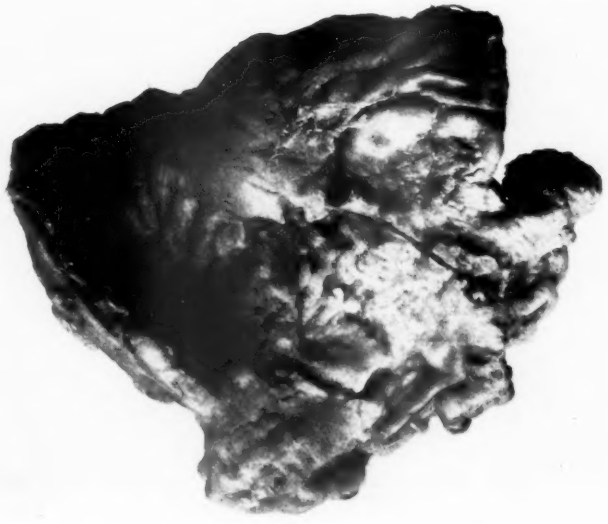

Fig. 12. Case 3. Photograph of Kaiserling specimen, showing mucous membrane surface.

Fig. 13. Case 3. Diagram of anatomical relations after operation in case 3. U, umbilicus, colostomy above; Y, closed end of colon; X, closed end of rectum, to which there is an adherent loop of small intestine.

2, except, on account of the lower position of the tumor, that the rectum was removed down to the lowest plane of its peritoneal covering in the pelvis. (Fig. 10.) The opening in the end of the rectum and colon were closed by invagination, because the operator was doubtful whether a suture should be attempted. With my more recent experience, I should, at the present time, make the suture.

Pathology. (See Figs. 11 and 12.) The tumor is an adenocarcinoma; it has not infiltrated through the rectal wall; one gland in the adjacent mesentery showed metastasis.

Post-operative Notes. The patient had no complications, but it is interesting to note that now and then a little gas and fæcal matter passed per rectum. It was difficult to explain this, except on the supposition that a loop of small intestine had become adherent to the invaginated end of the rectum and a small pathological anastomosis had formed. Such a condition is a well-recognized post-operative complication, when the operation has been performed in this way. Cases of fatal post-operative obstruction have been reported. Goullioud and Faysse (loc. cit.) report one such case. This supposition was confirmed. In March, 1905, four months after the last operation, at the request of the patient, I opened her abdomen again, with the hope of restoring the continuity of the large bowel. There was no evidence of recurrence or metastasis. A loop of small intestine, apparently the jejunum, was firmly adherent to the closed end of the rectum deep in the pelvis. (Fig. 13.) It was so adherent that a complete separation would have injured the integrity of the small intestine so extensively that, without much doubt, resection and suture would have been necessary. In view, therefore, of the possibility of two anastomoses, I did not think it was justifiable at that time to attempt to restore the continuity of the bowel in a patient whose only discomfort was a colostomy.

HISTORY OF OUR KNOWLEDGE OF ASPIRATION DRAINAGE IN EMPYEMA, AND OTHER SURGICAL CONDITIONS[1]

By JOSEPH D. BRYANT, M. D., New York City

POTAIN is to be regarded as the pioneer in this field, because he first applied the principle of siphonage to empyematous cavities. His siphon, the one comprising but a single tube, was first made known to the profession in 1869 (1). To this tube, introduced into a trocar opening, were attached two others, in T or Y shape. The upper was connected with a vessel, which was filled with fluid and held above the level of the bed, while the lower was connected with a vessel below the level of the bed. The inferior tube and vessel then acted as a siphon, and as the contents of the pleura were evacuated by siphonage, the medicated water in the upper vessel passed into the cavity, irrigating it and applying antiseptics. This primitive attempt at siphonage was intermittently used, and, as duly stated, combined with lavage. Numerous modifications of Potain's apparatus soon followed, and some of these may be mentioned later.

But, in the mean time, Playfair (2) of England had introduced in 1872 a method which he termed "subaqueous drainage." A tube of rubber armed with a glass index was introduced through a trocar opening, and allowed to rest in a graduated glass vessel containing water and placed under the bed. The tube was sealed to the chest-wall. This apparatus was so modified that patients could walk about, and was therefore "permanent siphonage." After some brilliant results, it fell into disuse, because air *would* sometimes gain admission into the pleural cavity. Nevertheless, Playfair seems entitled to priority for the introduction of continuous drainage. He doubtless anticipated Bülau by some years, and Cestan, in his work on empyema, calls permanent siphonage the "Playfair-Bülau method."

Bülau's method of permanent siphonage is said to have been devised independently by its author in 1876, and was used by some of his colleagues soon afterward. It probably did not get into print until 1881 (3). It differs but little from that of Playfair. A drainage-tube was sealed into a trocar opening; a rubber tube was attached, communicating with a bottle filled with fluid. Originally used in bed, the apparatus was made portable. The method came into wide use in Germany. In this connection we may state that Bülau and his colleagues claimed that permanent siphonage is really, in part, an aspiration procedure, in that the act of siphonage lowers intrapleural pressure and tends to cause a partial vacuum. There is therefore, perhaps, no radical difference between aspiration siphonage and direct aspiration.

It is probable that Tachard, a Frenchman, anticipated Bülau in the use of permanent siphonage, as he claims to have used it in 1874, while ignorant of Playfair's work. In any case, his apparatus was used only after pleurotomy, and his own countryman, Cestan, does not appear to concede him any claim to priority in the use of aspiration drainage as a sole method of cure. In the same class with Tachard is Revilliod (4), the eminent Swiss surgeon, who reported the use of permanent siphonage in 1880. He seems to have been unaware at the time of the labors of Playfair and Bülau; like Tachard, he regarded permanent siphonage as largely an incident in the after-treatment of pleurotomized cases, while awarding to it a much greater share of credit than did Tachard.

Denncé (5) of Bordeaux seems to have made an attempt to render Potain's method of intermittent siphonage a permanent procedure. His apparatus seems to have been practically that of Playfair, Bülau, and the others. We are ignorant as to how far he was aware of the work of his predecessors and contemporaries. But as Potain formally renounced the principle of siphonage in 1888 (in favor of pleurotomy), it is evident that the method of Denncé led to no practical results.

To sum up the state of affairs in the 80's

[1] Read before the American Surgical Association, Cleveland, Ohio, May 30, 1906.

of the past century, Bülau's method was the one in common vogue. It was fairly well known in leading German clinics, and naturally underwent several modifications, which need not be detailed here.

In 1887, Subbotin (6), a Russian surgeon, seemingly unaware of the work of his predecessors, proposed a method of aspiration drainage of all abscess cavities. The principle was that of siphonage, and was first demonstrated publicly on a case of empyæma. The author seems to have had no idea that his apparatus could be used continuously, yet may deserve some credit for extending the principle of aspiration drainage beyond mere empyema.

In 1889, Storch (7) reported what he considered to be an innovation in the application of the principle of permanent drainage. He applied the so-called Bunsen's aspirator, and describes his method as "bottle aspiration." A contemporary writer speaks of Stoch's apparatus as a "modification of Bülau's." But Storch has used his principle as early as 1884, and regarded it as essentially different from Bülau's original effort. It is evident, however, that not a few authors of recent date have evolved the application of Bunsen's bottles from Bülau's original apparatus. The complicated use of three bottles is of course adapted only to bedfast cases. This leads us to remark that measures for permanent aspiration drainage must differ widely as to their applicability.

During the 90's of the past century the "method of Bülau"—as it had become commonly known—continued to gain adherents. The entire subject of siphonage had become concentrated under his name, and has, in part, up to the present day, gained ground in many quarters, naturally with many modifications and reservations.

The first great innovation in the shape of direct aspiration—as distinguished from the indirect or siphonage method—was introduced by Perthes (8) in 1898. This surgeon simply applied Bunsen's hydraulic pump—a laboratory instrument—for direct aspiration of pleural cavities. The drainage-tube is sealed into a thoracotomy incision, as usual; the discharge is collected and measured in a suitable vessel. A manometer is attached, so that when a certain degree of negative pressure is attained the suction is arrested. It was employed by its originator in cases where siphonage and more radical procedures have failed. The results appeared to be favorable in the main, even as a last resort; but Perthes advocates

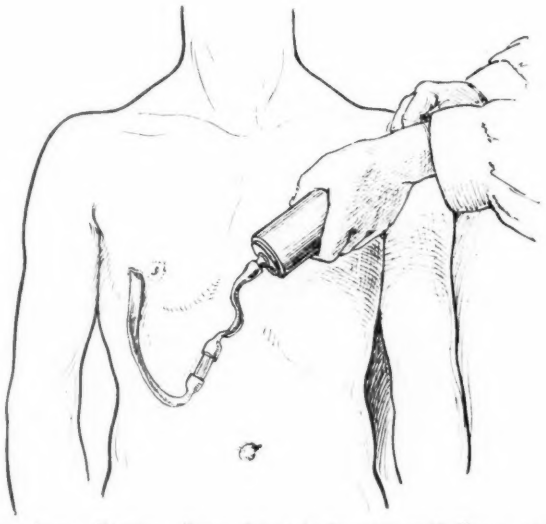

Fig. 1. Using the syringe. Showing collapse of the tube from too rapid effort at withdrawal of the fluid.

his method before all for the radical cure of empyema.

According to Cestan (9), Storch advised supplementing the ordinary siphonage principle with an atomizer bulb, by means of which the discharge of the fluid was hastened at intervals. The same authority states that Revilliod, through his pupil Archqwski, described a very similar apparatus. Both these authorities originally used the siphon principle alone.

Revilliod appears to have used a series of apparatus for each patient, which varied with the stage of the disease. Thus at first, with patient in bed, a cumbrous siphon device was used; later, this was replaced by a small portable siphon apparatus; finally, when the discharge had become reduced to one or two ounces daily, the siphon was replaced by the aforesaid aspirating device, connecting with a rubber tube provided with an atomizer bulb.

During the present century the methods of Bülau and Perthes continued to claim recognition. In this country, not a few articles have appeared in which one or the other is advocated. Dr. W. Van Hook (10) has advocated Perthes's method. Dr. Usher (11) of Wyoming recommends the use of the air-pump, but does not mention the labors of his predecessors.

Burmeister (12), a German surgeon in Chili, has recently recommended direct continuous aspiration drainage for cysts of the liver, pancreas, etc. He uses the so-called Finkenn suction-pump, both for aspiration and irrigation, with evident good results, and states that he has employed the method for years. He quotes only Potain.

At this time I respectfully beg leave to state that I am again calling attention to a plan of application of this form of treatment of empyemic cavities in the thorax, to which in the year 1900, in the *Jacobi Festschrijt*, a somewhat brief allusion was made. At that time this case was correctly regarded to be the only one previously treated by the collapsed rubber bag as an agent of aspiration, at least so far as has yet been determined. It may not be amiss if again, at this time, the case be briefly narrated, with the idea of justifying the primary and other considerations respecting the worth of a somewhat novel means of accomplishing a long-established purpose.

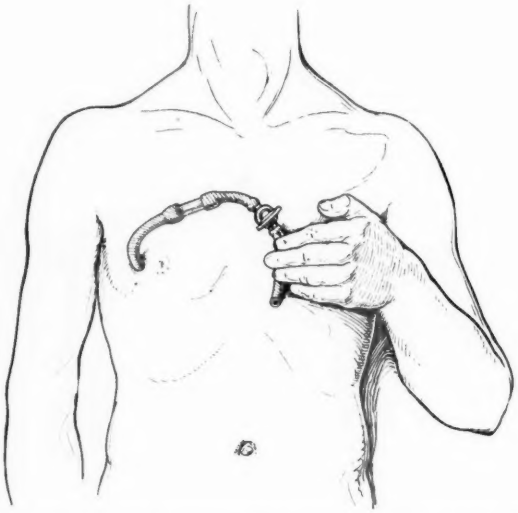

Fig. 2. Syringe removed; thumbscrew turned, preventing the entrance of air; tube ready for application of rubber bag.

While the patient in question was riding rapidly down-town on a trolley-car his thorax was pierced at the right side by a thill or shaft of a vehicle going in the opposite direction, propelled by an unruly horse. One end of

the shaft entered the pleural cavity at a point just below the right nipple and corresponding to the fourth rib, passed backward between the third and fifth ribs to about their posterior third, and escaped at the right side, lacerating extensively the pectoral muscles. The lateral part of the fourth rib was broken into two fragments, each about four inches in length, and anterior fragment remaining attached to the fifth rib only by means of distinct intercostal tissues. The anterior fragment was likewise attached, but only by means of shreddy tissues. The opening into the thorax was about eight inches in length, corresponding to the space between the third and fifth ribs, which were not injured. The external soft parts contiguous to the wound were obviously much lacerated. The lung was not injured.

I will not enter into the detail of the treatment, since, as far as this case is concerned, in this connection, the real problem consisted in keeping the cavity drained and at the same time overcoming the deformity often attending recovery in cases of empyema from all causes.

The idea that prompted the use of the rubber bag for the purpose of continuous suction was suggested to me by the interrupted employment of the syringe (Fig. 1) for the purpose of withdrawal of the fluid from the cavity. The collapse of the rubber tube during rapid withdrawal of the fluid by the syringe (Fig. 1) suggested a continuous slow exhaustion of both fluid and air from the cavity by means of the application to the tube of a collapsible rubber bag. (Fig. 2.) The introduction of the segment of glass into the rubber tube enables one to notice the passage of fluid along the tube into the bag (Fig. 3), together with a thumbscrew to prevent the entrance of air during the emptying. Cleansing and adjustment of the bag were matters of easy conception and prompt adoption. The sealing of the tube to the chest and the application of the retaining dressing (Fig. 4) completes the outfit. A little later the attachment of a glass receptacle to collect the fluid in its passage toward the rubber bag was used by means of a T-shaped hard rubber tube. This latter measure, however, was not deemed of sufficient practical importance to encourage a continued employment.

The recovery of the patient already cited without special deformity or interference with respiratory function prompted the determination to apply again the apparatus with renewed opportunity. Soon after, a patient with extensive right-sided empyema was referred to me for treatment by my colleague, Dr. Janeway. After excision of a small portion of rib at the usual site and the evacuation of the empyemic products, the apparatus was applied. The history of this case strongly suggested the fact that the empyema was secondary to pulmonary abscess, dependent on tuberculous involvement. At first the apparatus removed the discharges from the empyemic cavity as soon as formed; later, however, the power of suction was frequently quickly lost, because of the entrance of air into the cavity, thereby promptly disposing of the vacuum. When the vacuum in the thorax was suitably maintained, the respiratory movements of the chest were synchronously indicated by the changing dimensions of the rubber bag; respiratory inflation of the thorax was attended with a corresponding increased inflation of the bag. The uncertainty of maintaining the integrity of the vacuum in this case was, a little later, found to depend on the fluctuating control exercised by some presumptively cumulative or movable substance over the entrance of air through a pulmonary perforation of minute or changeable dimension. It is therefore noted at this time that any uncertainty regarding the presence of pulmonary perforation in a case of empyema can be quite well settled by this measure,—in any event, after a little delay in unhealed perforations.

In another case, the sequel of pneumonia, 45 ounces of pus were aspirated from the left pleural cavity. The apparatus was applied, but behaved badly, exercising suction in an interrupted manner at varying intervals. Cough occasionally attended its action, and also the introduction of fluid into the cavity for the purpose of estimating its dimensions. Finally, these manifestations suggested the thought that pulmonary perforation might be present, which fact was confirmed by the expectoration of methylene blue introduced into the empyemic cavity for the purpose. The physician in charge of this case candidly suggested that the per-

foration might have been caused at the outset by the aspiration-needle or the trocar, the introduction of the latter of which was attended with transient though decided hemorrhage. This case, however, was healed entirely in eight weeks, although characterized by the abundant discharge of fœtid pus during much of the time.

The remainder of this brief paper will be restricted to: 1. The method of application; 2. The duration of treatment; and 3. The practical utility of the plan.

Regarding the application of the apparatus. As can be readily surmised, it is not easy so to adjust it to the chest-wall as to maintain an active vacuum for a considerable length of time. The difference in the topography of the external surface of the chest, the movements incident to the respiratory act, and other disturbing influences, are often sufficient to shorten unduly the periods of practical activity of the apparatus, because of the entrance of air from without through the external opening. The use of adhesive plaster, of rubber tissue applied with chloroform at the borders, of wet absorbent cotton, and of tenacious compounds like oxide of zinc ointment, are in order, each one of which is serviceable in direct proportion to the care taken in the application. I desire at this time to admonish that especial care should be taken in the application, or contiguous substances may be forced through the opening by atmospheric pressure into the cavity, as once happened with absorbent cotton under my notice. The duration of treatment will depend substantially on the considerations kindred to those of other parts of the body when suffering from similar afflictions. The nature of the infliction and of the complications, the care in the cleansing and drainage during the course of recovery, will exercise potent influence here, the same as in other parts of the body, plus the influence of the respiratory acts.

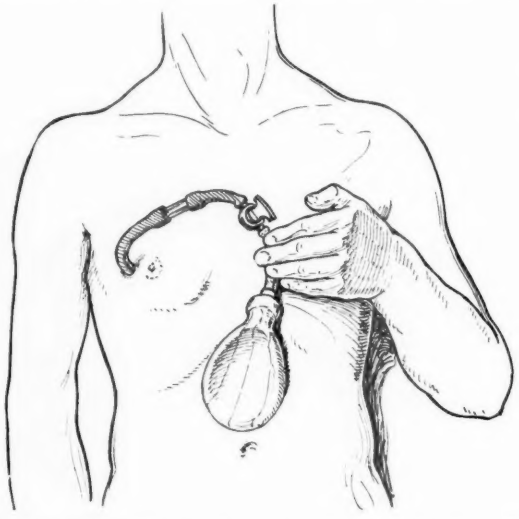

Fig. 3. Collapsible rubber bag applied; thumbscrew turned and bag in action. Glass segment shown.

In connection with this important part of the topic there are two features for the occurrence of which I desire to express sincere regret, and for one of which I am disposed to regard myself remiss; viz., the fact that of the considerable number of cases treated in two important hospitals by this method, the records were so faulty as not to entitle them to the patience of indulgent mention, especially in regard to the length of the time of treatment after the evacuation of the pus. However, in this respect my burden of responsibility is somewhat lightened by the

fact that in a serial collection of 1,470 cases of empyema, considered by different writers, only in a series of 75 cases (Dr. Dowd) was any reference made to the final outcome of the cases. In the instance of Dr. Dowd, however, in his collection of cases between the ages of two and fifteen years of age, he reported forty recoveries from operation in from one to three months, sixteen in from four to six months, and five cases in from six to twenty-nine months. The paucity of the number in which statements of final outcome are registered would suggest that rather too frequently than otherwise the interest in this class of patients, so far as final outcome is concerned, ends at a time not far removed from the completion of the operation for relief itself.

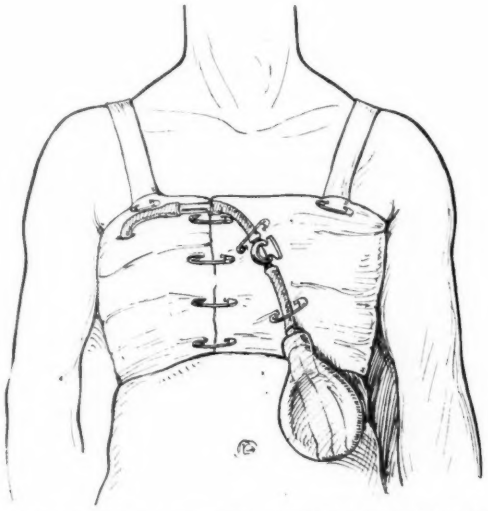

Fig. 4. Dressing applied; apparatus fastened in place and bag in action.

The cases of my own thus treated range from substantial recovery under one dressing (two) to unrecorded time in the others. The average in cases treated by this apparatus is from four to eleven weeks, the latter instance being prolonged by tuberculous complications in the lung. Usually, however, six to eight weeks are the extremes of treatment.

The practical utility of the plan is not one which I am disposed to emphasize in a startling degree as a substitute for rib resection, but, instead, to commend it because of its simplicity and effectiveness as a substitute for other measures of a similar character in instances suited to its application. The apparatus is cheap, available, effective, easily managed even by the patient, who need never be in bed or detained in the house because of its employment. The vigor of the suction can be regulated by the size and the expanding power of the rubber bag, and the freedom of communication through the tube, which can be regulated by the position of the thumbscrew. The aspiratory influence thus exercised on an empyemic cavity is often prompt and decided, especially when the influence of expansion of the bag is not hampered with very dense fibrous exudate. The influence of negative pressure supplemented by the normal respiratory expansions rapidly diminishes the size of an empyemic cavity in many instances, especially when it is of considerable dimensions; and for this reason it should be utilized to reduce as much as possible the size of a previous intractable cavity before thoxacotomy is practised. The rubber tube may be passed into the thorax through a large canula, by the means of which the fluid contents have already escaped, and the apparatus connected therewith. In cases of simple infection, and

those in which, for any reason, serious operation is objectionable, or other forms of aspiratory is desirable, this appliance is commended to your judicious consideration with the hope that it may prove serviceable.

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HYPERPLASTIC TUBERCULOSIS OF THE INTESTINES[1]

BY C. B. G. DE NANCRÈDE, M. D., LL. D.

Professor of Surgery and Clinical Surgery and Director of the Surgical Clinics in the University of Michigan; Professor of Surgery and Clinical Surgery, Dartmouth Medical College

AND

E. E. BUTTERFIELD, M. D.

Demonstrator of Pathology, University of Michigan

MY main object in presenting this paper is to put on record another instance of that rare manifestation of tubercle in the intestinal tract, the hyperplastic form, occasional instances of which have been reported during the past fifteen or eighteen years. The only account of such a case noted in this country, that I have been able to find, after a cursory study of the literature, is one by August J. Lartigau of New York City, published in the proceedings of the New York Pathological Society for 1900–01, pp. 103 et seq.

I shall present a brief historical account of the cases reported by various authors, without following an absolutely chronological order.

The sources from which I have drawn this information are the article by August J. Lartigau, already mentioned, and the thesis for the doctorate in medicine of Ernest Motel, presented in February, 1900, entitled "Étude de la Tuberculose de l'Intestin Grêle à Forme Hypertrophique."

It is most difficult, and sometimes impossible, to determine whether Motel is reporting cases of the genuine hypertrophic form, or merely those where much thickening from the cicatrization of tubercular ulcers has supervened. Having been unable to consult the original articles, I shall give a list of Motel's cases and append his bibliography, which probably comprises all of any importance of Continental origin up to 1900. Doubtless a longer search through the literature would result in unearthing a few additional cases but a study of Lartigau's and Motel's writings, with Dr. Butterfield's remarks in this paper, will supply all the information requisite concerning every form of intestinal tuberculosis from the clinical as well as the pathological standpoint.

Leudet, in 1853, presented to the Société Anatomique a tubercular tumor of the duodenum, and in 1874 a specimen of a tubercular stricture situated at the junction of the upper and middle thirds of the small intestine. Spillmann, in 1881, devoted his Thèse d'Aggregation to tuberculosis of the intestinal tract, but it is doubtful if he was acquainted with the true hyperplastic form. Köberle, in 1881, removed two meters of the small intestine on account of four strictures resulting from ulceration of Peyers patches, which Motel thinks may have been tubercular, but neither of these

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cases can be with any certainty determined to be of the hyperplastic form, although they may have been. To the same doubtful class belongs a case of resection for stricture performed by Dezanneau in 1891. In 1888, Girode (Thèse, Paris) dealt with intestinal tuberculosis, but appeared not to have met with a case of the hyperplastic form. In 1889, Souchier and Hacker report (according to Motel) cases operated upon where the tumors situated in the ileocæcal region so closely simulated carcinoma (as mine also did), that only the microscope could determine their tubercular nature. Darier, in 1890, found, post-mortem, eight valvular, diaphragm-like strictures in the course of the small intestine, the uppermost being situated near the duodenum, the lowest just above the ileocæcal valve, the total length of the small intestine being reduced to four meters. From the record it cannot be determined whether the strictures were due to the hyperplastic form or not. G. Lyon, in the *Gazette des Hôpitaux*, No. 139, 1891, published a paper on intestinal tuberculosis. Pilliet and Hartman, in 1892, published a paper in the *Montpellier Médical* on the sclerosing process sometimes following tuberculosis of the intestine and leading to stricture formation. About this period the writings of Baillet, Mockenhaupt, Zimmermann and Becker may be consulted with profit. During 1892, Le Bayon, in an inaugural thesis, writes of tubercular typhlitis, but I cannot ascertain whether any of these writers reported any new cases of hyperplastic tuberculosis, or merely wrote papers on this subject founded on the observations of others. Czerny and Salzer, in the same year (1892), report some cases, according to Motel, but I have not seen the original paper; hence I am in doubt as to the exact form of tuberculosis. Benoit, in 1893, collected and published most of the facts previously known concerning intestinal tuberculosis. Dupont, in 1894, continued this study, eliminating, however, for his purposes, primary tuberculosis of the intestine, considering this purely surgical. He recognized the occurrence of the hyperplastic variety, which he stated was often confounded with carcinoma, and that this form is commonly seen in patients absolutely free from pulmonary tuberculosis. Coquet, during the same year, presented an inaugural thesis describing the neoplastic variety of tuberculosis, remarking that this is frequently confounded with other neoplasms, its tubercular nature being overlooked unless microscopical examination is made. In 1893, Baillet, in a paper dealing with resection of the intestine, concludes that this operation in the ileocæcal region is the operation of choice for tubercular stenoses, quoting Mockenhaupt, Zimmermann, and Becker, Creikx (Société Belge de Chirurgie, 1895), contributes a paper on tubercular intestinal stricture which probably does not deal with the hyperplastic variety. Sourdille, in 1895, recognized that cylindrical stricture of the rectum was often tubercular, he being the first to describe this condition as a true tubercular neoplasm, and pointed out that a rectal stricture, when not congenital, is not necessarily syphilitic, but may be tubercular. Hofmokl, probably, also observed the hyperplastic form about this time. Goshel, Weisinger, and Korte then studied this question of tuberculosis of the intestines. Hoffmeister next called attention to tubercular strictures of the intestines, founding his paper on twenty collected cases, including one of his own Twelve of these were operated upon and eight found at post-mortem. Boschgrewink, Lennander, Prochwink, and Schiller report cases. During 1897, Riche and Chavannez reported several cases, soon followed by others by La Pointe, Bezançon, Carel, and Claude. Itié, at Montpellier, published, in 1898, a thesis on hypertrophic tuberculosis of the intestines. Bernay's thesis, defended at Lyons in 1899, deals with the same subject. Guinard showed to the Société de Chirurgie, March 22, 1900 (?), a specimen of the same nature, and Tuffier, on May 10th, exhibited to the same society a specimen of a similar character Finally, Monnier published in the *Archives provinciales de Médicine*, 1899, a case upon which Motel founds his thesis, antedating the last two reports in its performance, as the case was operated in 1894, although not published until 1899.

I shall take the liberty of condensing the clinical history of Dr. Lartigau's case, supplied him by the patient's attending physician.

S. C., male, æt. 49 years, had been compelled to abandon his business shortly after the onset of his trouble, three years before his death. His family and personal history were negative. Without apparent cause, he lost weight and strength, so that the slightest exertion induced partial syncope. The skin became darker and almost uniformly bronzed. About two months after the commencement of his illness, he suffered from frequent, universal, non-localized, cramping abdominal pains, although he sometimes "fancied they were most intense in the right iliac region." Primarily, the attacks were of short duration, lasting only five minutes, and appearing irregularly at intervals of about one week. Later, the attacks would last for half an hour or longer, and would recur four to eight times daily. They seemed to bear no distinct relation to the ingestion of food on the one hand, or an empty condition of the stomach on the other. Vomiting occurred from time to time, especially during the painful paroxysms. All the symptoms steadily increased in severity, and poor appetite, with alternating constipation and diarrhœa, was noted, there having been throughout the illness a tendency to the latter. No blood was detected in the stools, nor could any abdominal tumor be palpated.

Eighteen months before death he first received medical treatment. He then stated he had lost thirty pounds in weight during the first year of his illness and was exceedingly weak. The deep generalized pigmentation mentioned was present, but the conjunctivæ and mucous membrane of the mouth were free from pigmentation and were pale. No fever was present. Nothing abnormal was detectable in the abdomen, beyond some tenderness on deep palpation, especially in the right iliac fossa. The spleen was not palpable. The superficial lymph-nodes were nowhere enlarged. The diagnosis of Addison's disease was made, and under treatment addressed to this condition, the patient improved slightly, putting on some flesh, while he had less abdominal pain. Following this improvement his symptoms became aggravated, an evening rise of one or two degrees F. above the accepted norm being observed. Attacks of syncope, so easily induced as to compel his remaining in bed most of the time, commenced to be common about two months before his decease. A few days before death, right-sided lobular pneumonia developed, hastening dissolution.

In Dr. Lartigau's case the post-mortem examination revealed no adhesions between the small intestines. When the upper third of the ileum was reached, "a noticeable increase of the thickness of the wall became apparent," the tissue feeling firmer and more stiff than normal, until, when the mid-portion of the ileum was reached, the bowel was a non-collapsible, firm tube, the resistant wall measuring at the junction of the middle and upper thirds of the small intestine 4 to 7 mm. in thickness. As the ileocæcal region was approached, the thickening of the walls steadily increased until in the last 30–40 cm. it measured 1 cm. The walls of the caput coli measured 2.7 cm., which was bound down by old adhesions; the ileocæcal valve was also thickened. The walls of the ascending colon measured 1.2 cm. below, but thinned out to .75 cm. at the hepatic flexure. The transverse colon maintained about the same thickness (.75 cm.), but the descending colon gradually thinned out until it reached its normal condition when the sigmoid flexure was reached.

Section of the hard walls showed them to be of a gray whitish color, and they seemed macroscopically to be composed of fibrous tissue. The thickening seemed fairly uniform, except the posterior wall of the cæcum, where it was fully 1 cm. thicker than anteriorly, in decided contrast to the irregular thickenings described as present in my specimen. Neither tubercles nor caseated areas were detected, and, except in the last 40 cm. of the ileum, the caliber of the bowel seemed unaltered; here it was lessened "by about one third." The same was true for the colon until the transverse portion was reached, when, pari passu with the decrease in thickness of the bowel-walls, the lumen increased, to attain the norm when the sigmoid flexure was reached. No ulcerated areas were observed, the mucous membrane seemed to be normal, although somewhat pale in the upper ileum, but gradually became thickened with the induration of the other coats, and conversely thinning out as they became more and more normal. The same remarks apply to the mucous membrane of the large bowel. Papillomatous masses were noted projecting from the mucous membrane, averaging 4 or 5 mm. in length, which were most numerous in the lower ileum, but were apparently absent in the upper portion of the small bowel. Microscopically, "the mucosa was thickened, about four or five times beyond the normal." This thickening was largely due to massive infiltration with round cells. The surface epithelium looked normal. The papillomatous outgrowths were directly continuous with the submucosa, and present the same general round-cell infiltration observed throughout the various layers. They further contained unstriped muscle fibers con-

tinuous with the muscularis mucosæ. The submucosa presented the greatest degree of round-cell hyperplasia; a similar infiltration also existed in the muscular zones. No histological tubercles were observed, but sections stained for tubercle bacilli revealed great numbers, especially in the mucosa and submucosa."

It is interesting to note that tuberculosis of the suprarenal capsules existed, which accounts for the bronzing of the skin and some of the other symptoms of Addison's disease, all of which were absent in my case. It is needless to say that the mesenteric lymph-nodes were also tubercular. The other post-mortem findings have no bearing on the intestinal condition; hence they will be omitted.

Hyperplastic tuberculosis, taken from center of tuberculous mass.

The essential points in the history of my case can be briefly stated, while the operative technique being in no way peculiar, the details will not be described.

E. H., æt. 39 years, married, American, by occupation a stationary engineer, of good personal habits, was admitted to the University Hospital May 22, 1905. His family history was free from any hint of tubercular predisposition. He had had the usual diseases of childhood, with satisfactory convalescence. He had had one attack of gonorrhœa twelve years ago, from which he had recovered in about six weeks, since which time, until the onset of his present ailment, he has remained perfectly well. The diagnosis was tumor of the cæcum, which was probably malignant, and possibly tubercular, as had been suggested by his physician.

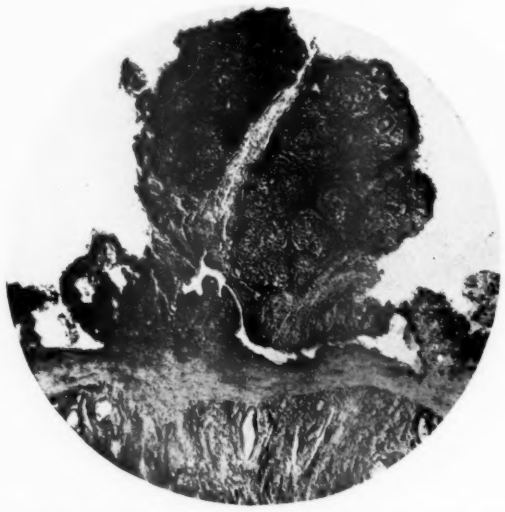
He had first noticed the present trouble during August, 1904, having had an occasional "stomach-ache," occurring during the latter part of the day. One afternoon (the date could not be recalled) during the latter part of November, 1904, he was suddenly attacked with severe abdominal pain, located in the right side and epigastrium, which was followed by violent emesis. Returning home, he again vomited freely, after which the griping abdominal pain ceased, he being able to sleep through the whole night in comfort. He remained well until Christmas, when he had such severe diarrhœa that he consulted a physician on January 2, 1905, who detected a small right-sided tumor in the abdomen, which he could not find at the next visit, January 23d, but did palpate on a subsequent occasion, about the middle of February, 1905. The physician then thought the mass larger, and the patient was satisfied that it steadily continued to enlarge up to the time of his admission to the hospital. Weak-

ness and some loss of flesh, with occasional aching pain in the epigastrium and in the region of the tumor, was all the patient complained of on admission. There was no fever. The attacks of vomiting had not been repeated since November, but he has had one or two attacks of diarrhœa, each lasting for two days.

Operation May 25, 1905. The incision was made through the right rectus, and a tumor such as Dr. Butterfield describes was delivered and removed, the division of the colon being about 5 cm. above the termination of the cæcum, while the small intestine was resected approximately 80 cm. above the ileocæcal valve, the length of both bowels removed being 92 cm. Most of the small intestine removed was apparently free from disease, but distinct areas were markedly infiltrated, necessitating either numerous resections, some ten days. One week before death a slight fæcal fistula formed at the site of operation. No post-mortem examination was made.

The possibility, nay, the probability, of mistaking this disease for carcinoma, and thus perhaps being deterred from successful operative interference, is an additional reason for reporting my own case, which has already been published elsewhere as one of a series illustrative of intestinal surgery.

The striking peculiarity, the essence of this tubercular manifestation, is the marked thickening of the intestinal walls, extremely well shown in my own case, and which led French writers



Hyperplastic tuberculosis showing characteristic villous formation on serosa.

which would have been most unsurgical and apt to lead to gangrene, or the extensive excision I was forced to make. Union was effected by circular enterorrhaphy, and a small cigarette drain was employed. Recovery was rapid, interrupted by the formation of a slight fæcal fistula, which eventually closed, but the drainage tract remained open until the man's death. He was discharged August 12, 1905, and returned to his work, the sinus discharging a very small amount of pus. The cervical lymph-nodes were enlarged, and continued to increase in size after leaving the hospital. In November, 1905, he began to develop temperature, the larynx became seriously diseased, and he died exhausted about two months after his laryngeal symptoms appeared. A curious incident was the apparently complete disappearance of the enlarged cervical lymph-nodes about two weeks before death, this process occupying only

to term the condition "tuberculose intestinale à forme hypertrophique." Its point of election is the ileocæcal region, although it has been seen elsewhere. The disease appears to involve readily and extend along any coils of bowel which become adherent to the primary lesion, leaving intervening healthy portions, as in my case, for it extends widely in both directions from its point of origin, as shown in Dr. Lartigau's case. Dr. Lartigau's specimens differed markedly from mine and others quoted by Motel, as will be seen when comparing the abstract of his case and the description given by Dr. Butterfield of my specimen.

Macroscopical Description of Dr. de Nancrède's Specimen. By Dr. E. E. Butterfield. (From the Pathological Laboratory of the University of Michigan. By permission of Prof. A. S. Warthin.)

This consisted of 92 cm. of the small intestine, together with the caput coli and a portion of the ascending colon. The appendix was directed posteriorly, its upper two thirds being firmly bound down. In the ileum, just at its junction with the cæcum, there was an encircling band 6 cm. broad. It was composed of small nodules. The intestinal wall at this point was thickened to the extent of from 5 to 7½ mm. On section, the individual nodules, as well as the wall of the gut, were grayish white, glistening, translucent, and homogeneous. There were five other similar encircling bands in the 85 cm. of ileum. Between these bands the gut was apparently normal, but on close inspection there were seen beneath the serosa a few pin-point to pin-head semitranslucent areas. The lymph-nodes about the caput coli and the mesenteric nodes were about the size of hazelnuts, and on section were firm, homogeneous, grayish white, and glistening. The mesentery, especially in the vicinity of the encircling bands, was studded with nodules of various sizes, many of which had long, slender pedicles. The small vessels in the mesentery and subserous tissue were injected, and small hemorrhages were seen at frequent intervals. The mucosa corresponding to the girdles of new tissue was not ulcerated, but through it could be seen small semitranslucent bodies of about the size of a pin's head.

Microscopic Appearances. Sections from the annular constrictions in the intestinal walls show a diffuse invasion of the muscular and submucous coats with epithelioid tubercles. The tubercles are rich in fibrous tissue cells and giant cells, but there is hardly a trace of caseation. The overlying mucosa is atrophic, but is continuous and free from ulceration. The subserous connective tissue contains closely packed epithelioid tubercles, and the small pedunculated nodules studding the peritoneal surface of the gut, which were so numerous in the gross specimen, are seen to be made up of similar tubercles.

The lymph-nodes in the region of the cæcum, and the mesenteric nodes, are almost entirely replaced by small confluent tubercles. The tubercles are of the same type as those in the intestinal wall; i. e., they are composed chiefly of fibrous tissue elements, epithelioid cells and giant cells. Only in the greatly enlarged glands is there a trace of caseation.

The intestine between the tubercular constrictions is practically normal, save for slight atrophy of the mucosa and scattered subperitoneal tubercles.

Diagnosis. It is a matter for regret that a study of the clinical histories of these two cases with those furnished by Motel reveals so little of distinct value for the diagnosis of cases of a similar nature. The existence of the disease can only be determined after a most careful consideration of all the symptoms presented, and its existence must be inferred, rather than positively affirmed. Many of the symptoms are common to a number of affections, such as abdominal tumors, intestinal obstruction, appendicitis, ulcer of the stomach, tubercular peritonitis, affections of the right kidney, and of the tubes and ovaries in the female. The symptoms most commonly observed are weakness and loss of flesh, lasting over a long period; the evolution of the condition, although continuous, being slow, and possibly dependent upon a bacillus of attenuated virulence. Painful crises are usually noted, due to the arrest of the intestinal contents at the strictured points, with localized distention, possibly with visible peristalsis of the intestinal coils, the result of localized tympany. These attacks are followed by cessation of the pain after characteristic borborygmi are heard, due to the passage through the obstruction of gas—sounds, as König says, somewhat like those produced by suddenly forcing fluid through a syringe. These attacks of colic may or may not be attended by vomiting, this symptom being of course commoner in the later stages of the disease, when obstruction of the bowel to a greater or less degree exists. Moderate constipation in the early stages, with occasional attacks of diarrhœa, are common, but the latter symptom may not be more pronounced and persistent than is often accidentally present in individuals without any intra-abdominal lesion. This was true of my patient, and of others quoted by Motel. Except in the latest stages, the vomiting suggests neither distinct intestinal obstruction nor appendicitis. There is no characteristic painful point, and there is absence of all general distention, and of the fever so common in even slight cases of appendicitis. The tumors are more or less mobile, steadily increase in size, are often multiple, and are apt to assume a cylindrical form; they are usually tender when gently palpated. If the patient be a male, of course all question of uterine, ovarian, or tubal tumors is at once disposed of. A steadily increasing tumor or tumors remaining fairly mobile for long periods without generalized distention, fever, or leucocytosis would be against the

presence of appendicitis, but would equally suggest malignant disease, especially if some difficulty were experienced in securing proper alvine evacuations. The differential diagnosis must be made chiefly from malignant tumors of some abdominal organ. The coexistence of pulmonary lesions seems very exceptional. It is true that these tubercular conditions are more prone to occur at an earlier age than carcinomatous disease; nevertheless, so many young individuals do suffer from malignant tumors that this point is only of relative value. Should a careful study of the symptoms indicate the possible presence of a tubercular lesion, a resort to the tuberculin test should settle the question.

Treatment. This resolves itself into excision of the affected portion of the bowel. Doubtless, fresh air, sunshine, tonics, and the ordinary measures addressed to the treatment of tuberculosis located elsewhere, may serve as roberants, and increase the peritoneal tissue resistance, as well as that of other parts, but no direct effect can be expected, as is the case in certain instances of ordinary tubercular peritonitis.

CASES QUOTED SPECIFICALLY BY MOTEL IN THE BODY OF HIS THESIS

Tubercul. intest. à Forme hypertrophique. A. Monnier. Arch. Prov. Med. 1899, 92–105. Three cases reported by König, with operations contained in the article in the bibliography supplied by Motel and appended to this paper.

Report of an autopsy of patient 58 years of age, with tubercular stricture of the small intestine. Boschgrewink. Motel. Op. cit.

Tubercular stricture of the small intestine, with operation. Frank Edouard. Op. cit.

Two tubercular strictures of the ileum: double resection, with recovery. Vohtz. Op. cit.

Resection of small intestine for tubercular stricture of the small intestine. Recovery. Salomoni. Op. cit.

Multiple tubercular strictures of the ileum. Resection and recovery. Lennander. Op. cit.

Tubercular stricture of the intestine. Resection; recovery (?). Cotterill. Op. cit.

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CANCER OF THE COLON[1]

WITH SPECIAL REFERENCE TO ITS DIAGNOSIS. TYPES OF OPERATION. METHOD OF AVOIDING FÆCAL DROWNING

BY WILLY MEYER, M. D., NEW YORK CITY

Professor of Surgery at the New York Post-Graduate Medical School and Hospital; Attending Surgeon to the German Hospital; Consulting Surgeon to the New York Skin and Cancer Hospital and to the New York Infirmary

THIS article is to deal with cancer of that portion of the large intestine which lies between cæcum and sigmoid. (See Fig. 1, from line *a* to *b*.) Malignant disease of the rectum and lower portion of the sigmoid romanum, where it is still detectable by means of the sigmoidoscope, as well as of the cæcum, which, usually, is more or less recognizable by palpation, will not be considered.

In the portion thus outlined, the sigmoid curvature is most frequently the seat of the disease; next in order of frequency come the two flexures and descending colon, then the transverse, and finally the ascending colon.

The tumor is usually solitary. Only a few cases of multiple occurrence have been recorded.

As regards the stage of life at which the disease is most commonly seen, it may be said that in the majority of cases it occurs after middle age, although it is not infrequently observed in the fourth decade of life, very rarely, however, in patients under thirty years of age.

As to the type of the neoplasm, there is no restriction. We find the infiltrating, medullary growth as well as the more frequent cylinder-celled cancer with glandular structure, and also the constricting scirrhus.

According to the type of tumor the clinical symptoms vary. In the case of an infiltration, the resulting tumor is usually large and readily palpable, sometimes even through a thick abdominal wall. Its tendency to ulceration and bleeding accounts for the presence of pus and blood in the defecations, and a certain *persistent*, exceedingly fœtid odor of the stools, which is overcome neither by purgatives nor by the use of intestinal antiseptics. In these cases, even in the absence of symptoms of obstruction, the suspicions of patient as well as physician are usually early aroused. Not so in the case of the sharply defined, circular scirrhus, often surrounding the gut in the shape of a tight, narrow ring. Symptomless almost, and at no time detectable by palpation, it has developed at the hepatic or lienal curvature, or in the colon pelvinum. Suddenly a fruit-pit, or some other descending foreign body, is arrested in the narrow lumen, or a congestion is set up by some mechanical irritation of the inner surface of the tumor. Complete or partial intestinal obstruction is the result.

The latency of the development of certain forms of carcinoma, then, is the principal cause of its late — often too late — recognition, here as well as in other parts of the body.

On the other hand, it is necessary that the physician should include the possible presence

[1] Read before the American Surgical Association, Cleveland, Ohio, May 31, 1906.

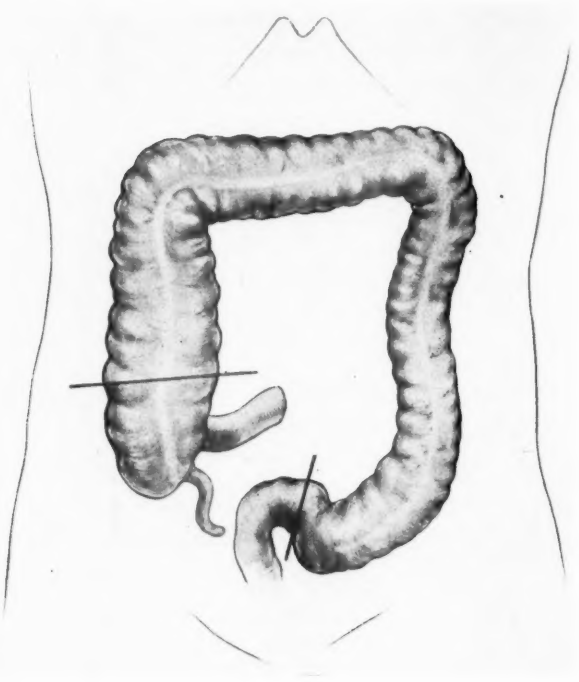


Fig. 1.

of this disease in his considerations in the face of obscure intestinal symptoms. It surely occurs oftener than is ordinarily accepted.

Every symptom, therefore, that justifies the suspicion of colonic cancer, and every method that may help to determine the correctness or incorrectness of such a suspicion, must be welcome; all the more so, as the prognosis of carcinoma of the colon is better than that of malignant disease in any other part of the gastrointestinal tract.

If the well-known trio of *subjective* symptoms — obstinate constipation, occasionally alternating with diarrhœa without any apparent cause, colicky intestinal pains, and vomiting or nausea — is well developed, the diagnosis of carcinoma of the colon can usually be made, even in the absence of a palpable tumor. But all three of these symptoms are rarely present. One of the most valuable symptoms, according to my personal experience, is that of periodic, not always painful, contraction within the abdomen, noticed by the patient *himself*, always more or less in the same locality, and, in later stages, often followed by a gargling sound, which sometimes is distinctly audible without the use of the stethoscope.

This phenomenon, which properly should be classed under the second of the trio of subjective symptoms, i. e., intestinal colics, is of such great importance that I would give it a special place. I would call it "*subjective* intestinal stiffening," in contradistinction to the "*objective* intestinal stiffening" (Darmsteifung), or tetanic recurrent peristalsis of the gut proximal to the seat of the disease, first described by Nothnagel, as a visible and palpable sign.

In one of the cases observed by me in conjunction with other physicians, this "subjective stiffening" of the gut was the only symptom complained of for eight to ten months, other clinical signs being indistinct. Then, after a fall upon the abdomen, intermittent chills and fever with peritonitic symptoms developed (per-

Fig. 2. Appearance of skin of abdomen four months after excision of ascending colon. The pathognomonic dermatological manifestations have disappeared.

foration). A large mass could be felt through the vagina, in the left side of the abdomen. Laparotomy demonstrated an ulcerating, malignant neoplasm of the transverse colon, about the size of a large orange, covered by suppurating omentum. The tumor had sunk down by its weight into the small pelvis and become adherent to the bladder, infiltrating its wall.

Such experiences teach the necessity of eliciting a most careful history from patients with vague abdominal symptoms, and of giving due weight to the same.

Another early subjective symptom of malignant disease of the colon and sigmoid flexure, recently emphasized by Tuttle (*New York Medical Record*, Nov. 4, 1905), is the markedly increased tendency to expel gas and the inability to retain it. Along with this increased passage of gas, early in the disease, there appears in the stool a certain amount of glairy mucus, never coagulated, as in typical mucomembranous colitis. Tuttle further calls attention to the fact that constipation is a late, and not an early, symptom. Frequent desire to go to stool, with no effectual result, according to his experience, is "a striking early symptom of cancer of the colon."

It is self-understood that such complaints, being common to many intestinal disorders, are of value only, if supported by one or more of the notable subjective or *objective* signs, which latter I will now briefly review.

1. TUMOR

According to Treves, a tumor can be made out in only forty per cent of the cases. Its manifestation affects the prognosis less seriously than is the case in carcinoma of the stomach, where, in many instances, the palpation of the

tumor is equal to a "too late" for the surgeon, as far as radical cure is concerned, although, in view of more recent statistics (1), this general belief would seem to require modification. Boas's careful personal observations confirm the conclusions of Peters and Calmers (2), that the degree of malignancy of the various types of carcinoma, especially in the case of carcinoma of the stomach, and their tendency to rapid proliferation, often are more important factors, as regards radical cure, than the duration of the disease. In other words, excision of a large, easily palpable tumor of slow development may prove curative, whereas in a more highly malignant, rapidly growing tumor operation may prove unavailing, even though it be done shortly after the appearance of the first clinical symptoms.

As stated before, cancer of the colon is usually less virulent than that of the stomach and rectum, as proven by its generally slow development and slight tendency to metastasis. Cases with characteristic cancer symptoms, covering periods of from two to six and sometimes eight years, are on record, and then colectomy was still well feasible.

In one of my own cases radically operated upon, a lady of 57, the disease had developed in the course of five years. The tumor, starting at the hepatic flexure, had gradually invaded the entire ascending colon, the strictured canal just allowing a small lead-pencil to pass.

As regards the size of the tumor, this varies between wide limits,— from the size of a walnut to that of a child's head. It is usually hard and nodular in consistence, and more or less tender. If situated in the transverse colon, particularly if near the hepatic or lienal curvature, a change of location is often observed.

Careful insufflation of the gut may aid in locating the tumor, and enable us to determine whether it be retro or intra peritoneally situated. Great care should be exercised, however, to avoid perforation.

Fig. 3. Lipoma of transverse colon. Resection with end-to-end anastomosis. Recovery.

2. METEORISM

Chronic circumscribed meteorism is of great assistance in locating the tumor. If it is general, all other clinical signs are of course rendered obscure.

3. FREQUENT, VISIBLE AND PALPABLE LOCALIZED PERISTALSIS (NOTHNAGEL'S "DARMSTEIFUNG")

If often followed by a peculiar, gargling

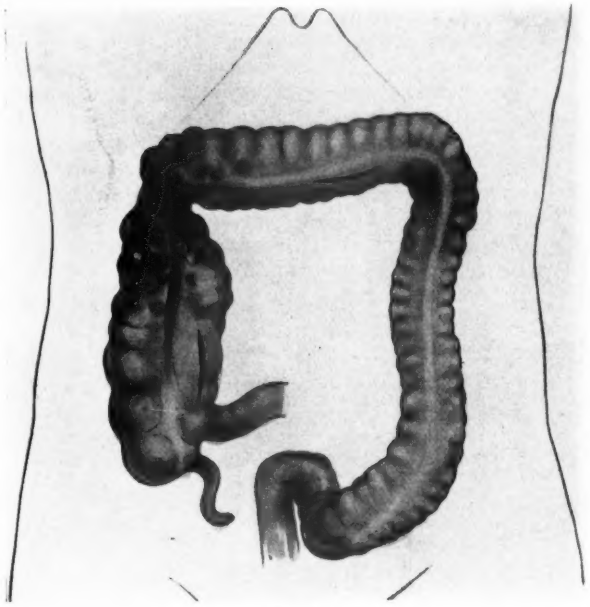


Fig. 4.

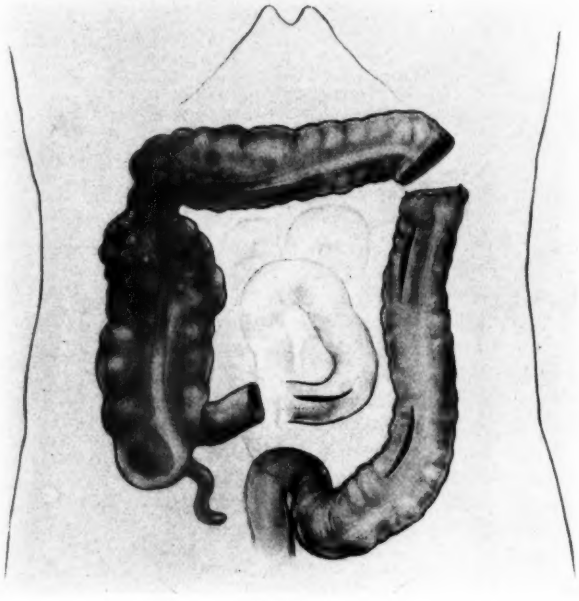


Fig. 5.

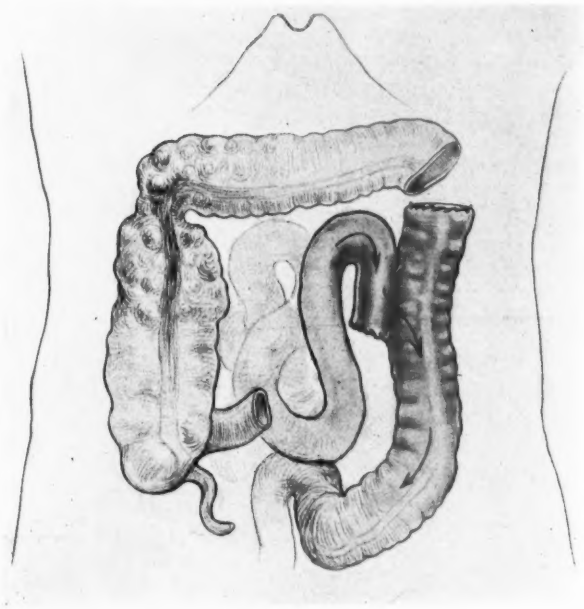


Fig. 6

Fig. 7.

sound, this, of course, speaks for stricture. It represents an unfailing pathognomonic sign, but, naturally, can be noticed only in emaciated patients. By quickly jerking the respective area of the abdominal wall, the peristaltic wave can be artificially produced, as in gastrectasy due to stricture of the pylorus. (Dr. R. Stein of New York has recently called attention to this fact. Article still unpublished.)

4. CHARACTERISTIC FÆCES

The stools may be entirely normal in spite of the constricting tumor of the large intestine. Having passed the stricture, the fæcal matter is condensed, through absorption of fluid; scybala are formed. Blood is found in only 15-25 per cent of the cases. The so-called "occult hemorrhage" in the stools is of little value. If pus and blood are present in larger amount, the differential diagnosis from chronic colitis is not easy. The history of the case, mainly with reference to similar attacks in former years, is here often helpful. Protracted irrigation of the lower end of the bowel by means of a funnel and rectal tube with end-hole and lateral eye — same as used for stomach lavage — may bring down small particles of the ulcerating tumor and thus promptly clear up the diagnosis. Regular examination of the fæces is, therefore, imperative in cases of this kind.

5. CAPILLARY ANGIOMATA AND PIGMENTED WARTS IN THE SKIN OF THE ABDOMINAL WALL

The rather sudden appearance of multiple capillary angiomata and manifold small pigmented spots and flat warts in the skin of the abdominal wall may be interpreted as a symptom of intra-abdominal (colonic) cancer, an observation first made by S. Pollitzer of New York, and later by E. Hollender, in the hospital and private practice of James Israel of Berlin (4), the correctness of which I have had repeated occasion to verify.

Pollitzer describes this phenomenon, under the name of acanthosis nigricans, in the *Reference Hand-book of the Medical Sciences*, vol. I, p. 51 (William Wood & Co., New York), as a disease of the skin and mucous membrane, characterized by hyperpigmentation and papillary hypertrophy developing in the course of an abdominal cancer.[1]

Fig. 8. Excised lowest portion of ileum with cæcum and ascending colon: the latter the seat of the malignant stricture. A flap of tissues grown into the lumen of the gut has been raised in order to show pronounced stricture.

The first recorded case of this disease occurred in a patient in Dr. Unna's Clinic for Skin Diseases, Hamburg, and was described by Pollitzer in the *International Atlas for Rare Skin Diseases*, No. 4, 1889.

According to him, the disease usually begins with a slaty or brownish discoloration of the skin of the neck, about the genital organs and the umbilicus. In other cases the first symptom to attract the patient's attention is the papillary condylomatoid proliferation affecting the mucous membrane of the mouth. Other regions

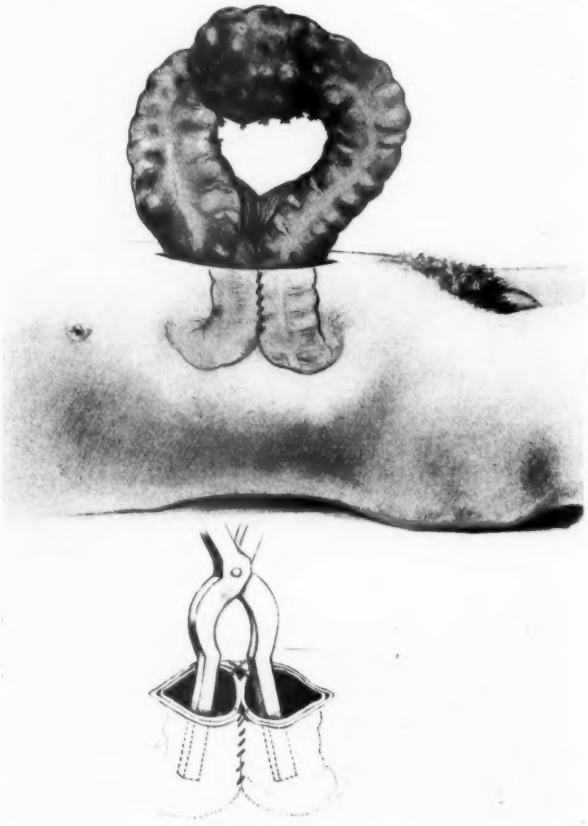
[1] In 1896 the same disease was described by P. Couilland under the name "Dystrophie papillaire et pigmentaire ou acanthosis nigricans; ses relations avec la carcinose abdominale." (Paris: Georges Carré et C. Naud.)

that may be affected are the palmar surfaces of the extremities, the axillæ, and the inframaxillary region, the anal region, and, in women, the vulva and vaginal mucosa. A striking feature of the distribution of the disease is its almost perfect symmetry.

In trying to explain this phenomenon, Polis a matter that future investigation must determine."

To the courtesy of Dr. J. Fraenkel of New York, who has given special attention to segmental innervation, I owe the following explanation of this interesting phenomenon:

"Pigment alterations and pigment anomalies



Figs. 9 and 10.

litzer says: "There is no doubt that the disease is directly dependent on the existence of abdominal cancer, but whether it be a cutaneous manifestation or a peculiar cancer intoxication, or whether it be due to changes induced in the great sympathetic ganglia through the pressure of the tumor on them, or to the combined action of both these causes, have various causes. Congenital hyperpigmentation and constitutional ephelides are usually associated with some altered function of the adrenals. Of distinct pathological character are pigmented wart-like changes in the skin observed in connection with changes of the arterial system.

"Arterial disease of the cranial system some-

times produces a crop of such changes on the face. The changes of the thoracic arterial system produce such marks on the trunk and extremities.

"Chronic intra-abdominal disease, particularly the degeneration of the splanchnic arterial system, produces such trophoneurotic changes in the skin of the abdomen. Their pathogenesis is not absolutely clear, and in the light of the newest knowledge, attributable to one of the following causes:

"1. Some change in the function of the adrenals.

"2. Some change in the function of the semilunar ganglia or splanchnic nerves, which are a part of the adrenal system.

"3. Some change in the structure of peripheral vessels, which are accompanied on their entire course by the so-called chromaffine bodies, which are regarded as a specified type of neural tissue, and related to the histological units of the medullary part of the adrenals.[1]

"Another group of trophoneurotic changes of the skin, pigmented and vascular nævi, is produced reflexly from a spinal segment which receives altered innervation from a viscus.

"This last-named origin of the changes is particularly suggestive then, when they are distributed somewhat in the area of the segmental innervation. They may be looked upon as a further stage of interference with the segmental function, of which the first is expressed by increased vasomotor and sensory reflexes (reflex hyperæsthesias)."

Personally, I consider this skin affection, which is due to trophoneurotic disturbances, an important pathognomonic sign of intra-abdominal cancer. It occurs only in a certain percentage of cases, and after the disease has made some progress. According to a personal communication from Dr. Pollitzer, he has found thirty-six such cases of acanthosis recorded in the literature, and in a decided majority of these a malignant tumor "in abdomine" was later demonstrated or strongly suspected. Personally, I have observed it four times, and though it appeared in a rather mild type, it nevertheless strongly suggested the condition that has been described as acanthosis nigricans.

[1] See also article of same author, "The Relation of the Nervous System to Visceral and Trophic Phenomena." (*New York Med. Record*, April 1, 1905.)

Case 1 referred to a lady, 56 years of age, with a large, distinctly palpable, inoperable malignant tumor of the sigmoid, adherent to the abdominal wall. The skin of the lower anterior portion of the abdomen was studded with these purplish and brownish spots.

Case 2 was that of a colleague, 75 years of age, with vague complaints of chronic intestinal disease. He himself pointed out to me the mixed cutaneous crop, not understanding its significance, which had then just been called attention to in the literature. Operation revealed the presence of a carcinoma of the transverse colon, which at no time had been palpable.

In the third case, a glance at the abdomen, over which were scattered numerous purplish spots and flat, wart-like brownish black excrescences, with innumerable smaller and larger pigmented spots surrounding the anterior wall like a wide girdle, made me place the diagnosis of carcinoma of the colon at the head of the list of possible alternatives, after having listened to the patient's history. Subsequent operation proved this assumption correct. Four months after successful excision of the ascending colon these peculiar dermatological manifestations had disappeared. Surely, an interesting observation! (Fig. 2.)

The fourth case is still in the hospital, in the service of my colleague. The patient, a woman of 56 years, suffered from constipation for the last three or four years; during the last eighteen months she has had frequent pains across the abdomen. A large, nodular, slightly tender, hard mass is palpable just below the border of the left costal arch; it is movable, and easily detectable on bimanual palpation. The anterior abdominal wall presents many capillary angiomata, smaller and larger brownish spots, not unlike freckles, and flat, wart-like pigmented skin infiltrations, as shown in the accompanying illustration.

Catheterization of the ureters proved the left kidney entirely normal, with unimpaired working power. On basis of this string of symptoms I made the tentative diagnosis of cancer of the splenic flexure and descending colon, although the statement that the sensation of stiffening had never been noticed, and the fact that in carefully ballooning the colon with air the latter organ seemed to

lie in front of the mass, made me somewhat doubtful as to the correctness of this diagnosis. Exploratory incision showed the transverse and descending colon normal. The nodular mass that had been palpated proved to be infiltrated cancerous lymphatic glands in the retroperitoneal space, secondary to a carcinoma of the pancreas.

6. CONTINUOUS LOSS OF WEIGHT AND INCREASING ANÆMIA

The regular use of the scales in suspicious cases cannot be too strongly urged. If the disease takes a slow course, patients may have their ups and downs, but a *steady* loss of flesh, in conjunction with gradually increasing anæmia and general weakness, not necessarily cachexia, points to the presence of carcinoma.

DIFFERENTIAL DIAGNOSIS

In cases with a palpable, non-ulcerative tumor, the following conditions come primarily into consideration:

1. Tumor of the kidney, or a floating kidney.
2. Chronic cholecystitis, or hydrops of the gall-bladder.
3. Benign, intracolonic, sessile tumor, usually lipoma or myoma. (See S. B. Ward, *Albany Medical Annals*, Jan., 1904.)

The latter, according to my experience, may produce the full trio of malignant disease: obstinate constipation, colicky pains, and vomiting or nausea. However, if situated in the transverse colon or in either of the two curvatures, the tumor will be found frequently to change its location to a marked degree; and such *pronounced* mobility then will speak for intracolonic attachment of a benign growth, especially if found in younger patients. The following case well illustrates the point:

Young woman, 20 years of age; typical symptoms; varying position of tumor; laparotomy May 22, 1901. Sessile growth, with broad base in transverse colon, proximal to lienal curvature; resection with end-to-end anastomosis by suture. Pathological diagnosis, lipoma. Rapid recovery. Re-examination, March, 1906, shows patient in perfect health. (See illustration, Fig. 3.)

If careful analysis of all symptoms still leaves doubt as to the true nature of the trouble, exploratory laparotomy is in order. In that case the surgeon must, of course, be prepared to add the required operation at the same sitting.

TYPES OF OPERATION

I. Radical Operations

1. Ideal. Operation in one sitting.

(*a*) In case of a circumscribed tumor: resection of the diseased portion, with end-to-end anastomosis.

The tension of the sutured ends, the uneven size of the afferent and efferent portion, with circulatory disturbances and insufficient muscular action, sometimes ulcerations within the former, also the greatly diminished power of resistance of the patient, in combination with the increased virulency of the bacteria inhabiting the colonic segment above the stricture, make this procedure a very risky one.

(*b*) In case of more extensive involvement of gut: lateral anastomosis in safe distance from the neoplasm, by means of suture, elastic ligature, or Murphy's oblong button.[1] (Figs. 4, 5, 6), or end-to-side implantation (Fig. 7), in case of ileocolostomy, best with the help of Murphy's ordinary round button, and excision of growth, including the infiltrated mesocolonic glands.

Unfortunately, the majority of patients thus afflicted reach the surgeon in a greatly reduced condition, when they are no longer able to stand this ideal procedure. Personally, I have never had the chance to operate upon an early case, every one of my patients presenting either a large, palpable tumor, peritonitis, or symptoms of obstruction with or without ileus.

2. *Operation of Choice.* Same as 1, but done in two sittings, as illustrated by the following personal case:

Woman, 57 years; bowel trouble for last five years; first, intermittent colicky pains and sensation of a sore spot in right side of abdomen, then attacks of nausea, but no vomiting; later, subjective intestinal stiffening; treated for gallstones for years. Examination October, 1905, reveals localized peristalsis; tumor indistinct;

[1] I consider mechanical means for perfecting anastomosis in these cases of great value in weak patients. In view of the fact that the button may drop into the afferent portion of the gut and then give rise to trouble. McGraw's elastic ligature deserves special attention. I have learned with increasing experience to look upon the use of the elastic ligature as a method that will save many lives. When performing such operations, the choice therefore lies, for me, between needle and thread on the one hand and the elastic ligature on the other.

pronounced typical eruption of skin in waistline, anteriorly; very anæmic; hæmoglobin 40. November, 1905, laparotomy through right rectus; cancer of ascending colon; gall-bladder normal; ileocolostomy with elastic ligature, ten inches above ileocæcal valve to distal portion of transverse colon; closure. Five weeks later, December, 1905, with patient's general condition much improved and bowels working regularly, median incision; tying of mesocolon; typical excision of cæcum and ascending colon from a point about five inches above ileocæcal valve to middle of transverse colon; application of crushing forceps to colon and ileum near anastomosis; ligature; purse-string suture, inverting stumps; continuous suture on top; no drainage. Uninterrupted recovery. May, 1906, perfect condition; patient has gained 35 pounds.

The excised portion of colon showed pronounced stricture, just permitting the passage of a small pencil. (Fig. 8.) In spite of this, there had never been obstruction to defecation, but stools had never been formed within last four years; lately diarrhœa, off and on, with particles of blood.

3. Temporary, partial eventration of portion of gut invaded by the tumor, after ligation of the respective piece of the mesocolon, inclusive of diseased glands; closure of wound (Fig. 9), followed 36–72 hours later by amputation of diseased portion about one half to one inch above surface of abdomen, with Paquelin, thus establishing a temporary artificial anus. Two weeks later, application of clamp, followed by typical closure of artificial anus (Fig. 10), being the so-called "Vorlagerungs-methode" of von Mikulicz, who reported eleven recoveries in twelve operations (5).

4. In cases of incomplete or complete intestinal obstruction of long duration, the weak condition of the patient and the far-reaching œdema of the distended afferent part of the colon forbid all of the foregoing operations. Primary enterostomy remains the patient's only hope of relief, to begin with. A series of operations is necessary to effect a possible cure; of course, interruption of this series, waiving absolute reclosure of the intestinal tract, may become necessary after any step.

The series of operations are:

(*a*) Enterostomy, which may be done under cocaine and in slight Trendelenburg's posture, — if time permit, according to Witzel's or Kader's method.

(*b*) After sufficient recovery, lateral anastomosis (under thorough inspection of local condition of the gut), plus immediate excision, or the latter done at a third sitting.

(*c*) Closure of enterostomy wound. If a water-tight fistula was established, removal of the tube suffices.

II. Palliative Operations

1. Lateral anastomosis in sufficient distance from growth; closure of abdomen.

2. Establishment of artificial anus. In the cases that here come into consideration, the artificial anus would best be established in the cæcal region or in the lower end of the descending colon.

3. In cases with pronounced meteorism and fæcal vomiting, enterostomy will, of course, have to be the first step resorted to, other operations to follow in accordance with the conditions found.

It is, naturally, of the utmost importance to the patient, and a great satisfaction to the surgeon, no matter whether he be doing radical or palliative work, to avoid the kind of seriatim operating described above.

The duration of the complete or incomplete obstruction, as well as the age and general condition of the patient, must guide the operator in determining what had best be done in the given case. Frequently, primary enterostomy will be found to promise best results. If a more aggressive procedure seem advisable, *fæcal drowning* or aspiration of vomit into the bronchial tubes has, until recently, been the patient's greatest source of danger, having caused many deaths. It would occur in spite of preliminary lavage and the use of a stomach-tube during or at the completion of the operation.

However, this danger has been overcome since the advent of Kausch's œsophageal narcosis tube. It is constructed on the principle of Trendelenburg's tampon-canula for the trachea, as follows:

An ordinary soft rubber stomach-tube is made to pass through a rubber balloon, the latter being seven centimeters in diameter when fully

inflated, and is securely fastened around the tube at both points of passage, the lower being two inches above the eye at the end of the tube. Emerging together with the stomach-tube from the upper end of this balloon, and passing along the same, is a thin rubber tube, which, a few inches from the outer end of the stomach-tube, separates from the same to enter another bulb of exactly the same size as the lower one, thus forming the connection between the two balloons at either end of the apparatus. From the opposite side of the outer balloon a small piece of thin tube is made to project for the purpose of inflation, which may be done by means of a hand-syringe. Before beginning the operation, this apparatus, with the lower bulb pressed empty and well anointed, is easily introduced into the stomach. Then the bulbs are distended and the small projecting tube is plugged or clamped. The narcosis tube is pulled upward until it meets resistance, which means that the lower bulb presses against the cardial opening, thus rendering it impossible for any stomach contents to pass through the cardia; every drop has to find exit through the tube. Care must be exercised, of course, to keep the balloons well inflated, but as the outer is of exactly the same size as the one placed internally, the former furnishes an exact index to the condition of the latter; if insufficiently distended and too much traction is employed, it is plain that the lower bulb might be pulled into the œsophagus. While the tube is in situ, the saliva cannot be swallowed; the patient's head should therefore be turned sideways and the pharynx wiped out from time to time. A slight Trendelenburg posture facilitates the exit of the saliva.

To prevent compression of the apparatus by the patient's teeth, a metal capsule resting on two springs is slipped over the same, the tube resting in a groove provided for it. The instrument remains undisturbed until the patient has fully come to after anæsthesia. If it is properly placed and fastened, all of the fluid of the intestinal tract which continually regurgitates into the stomach during the operation is carried through the tube into a pail beneath the operating-table. Hence the evacuation of the intestinal contents through multiple transverse incisions into the gut, with subsequent suture, which usually becomes imperative in order to accomplish reduction of the greatly distended coils after eventration, is rendered unnecessary, and consequently the danger of infection is materially reduced.

Kausch's œsophageal narcosis tube surely represents a most important addition to our instrumentarium for the treatment of colonic cancer, and should find a wide field of usefulness.[1] It is the only apparatus at our disposal for the purpose stated; it is perfectly safe. Kausch has used the device in three cases with perfect success (6). I have had no occasion so far to test it.

Personally, I have operated upon eleven cases of cancer of the colon, in which the tumor was located within the limits defined by this paper. They are, briefly, as follows:

CASE 1. Female, 33 years old; cancer of hepatic curvature, with multiple metastases in ascending and transverse colon. Colocolostomy in July, 1888; uninterrupted recovery. Patient in excellent condition nine months later; had gained 36 pounds in weight; presented before Surgical Section of New York Academy of Medicine. The patient then left for Europe, so that further operating here, as intended, became impossible. Primary ileocolostomy and resection of the diseased portion of the gut at a second sitting, I now think, would have been more advisable in this case. As far as I have been able to determine from the literature, this was the first case of colocolostomy done for malignant stricture.

CASE 2. Male, 46 years; cancer of hepatic curvature, involving ascending and major part of transverse colon. Ileocolostomy, end to side, Murphy's round button, February, 1899, with excision at the same time. At first, satisfactory recovery; then, suddenly, change for the worse, after severe attack of coughing; on changing dressing ten days after operation, it was seen that wound had burst open again; peritonitis; death two days later. Layer sutures of catgut had been used for closing wound. Since this experience I have always used through-and-through silk sutures for closing the abdomen in the male.

CASE 3. Male, 68 years; cancer of lienal curvature; intestinal obstruction; ileus. Ileosigmoidostomy, October, 1902; death 24 hours later, from aspiration of fæcal vomit and pneumonia. Primary enterostomy or cæcostomy would probably have been the wiser procedure, but artificial opening was refused by family.

CASE 4. Male, 46 years; cancer of transverse colon and hepatic curvature; very large tumor; fever; subacute peritonitis, due to perforation. Ileocolostomy; death six days later as a result of peritonitis.

CASE 5. Male, 65 years; cancer of ascending colon

[1] The apparatus may be had of Messrs. Tieman & Co., 107 Park Row, New York.

and hepatic curvature; intestinal obstruction for eight days; peritonitis; relief asked for, but enterostomy refused. Therefore, exploratory incision; afferent part of intestine enormously enlarged; probably distention ulcerations, for gut bursts despite most careful handling; closure of rent; multiple incision of eventrated coils; reduction; suture. Entire operation done in slight Trendelenburg posture, preceded as well as followed by stomach irrigation. At the moment that patient was lifted from stretcher into his bed, massive vomitus with aspiration occurred, causing instant death.

CASE 6. Female, 57 years; cancer of hepatic curvature, involving ascending colon. Ileocolostomy November, 1905. Excision of ascending and half of transverse colon five weeks later; good recovery; patient well at the present time. (See above.)

CASES 7–11. All were cancer of upper part of sigmoid curvature, with symptoms of complete or partial intestinal obstruction; pronounced meteorism, or symptoms of ileus. Treatment, small median or lateral exploratory incision on outer side of left rectus muscle, for the purpose of locating suspected tumor, followed by typical oblique incision parallel to Poupart's ligament for colostomy (or, latter incision made at once, in order to avoid two cuts); artificial anus in lower end of descending colon, with spur formation. Three recoveries, two deaths.

While the results in the foregoing cases are not particularly encouraging, it must be remembered that all, with exception of case 6, were in a more or less hopeless condition when they came for treatment.

Briefly restated, the main points of the foregoing remarks are:

1. The great importance, as well as the difficulty, of early diagnosis and timely operation in carcinoma of the colon, particularly in view of its comparatively favorable prognosis.

2. The necessity of most careful study and consideration of the often obscure symptoms of this trouble.

3. The great diagnostic value of —

(*a*) The so-called "subjective" as well as "objective intestinal stiffening" or tetanic recurrent peristalsis of the gut proximal to the seat of the disease.

(*b*) The multiple capillary angiomata in combination with the more significant small pigmented warts and spots that are frequently seen to appear in the skin of the abdominal wall. The latter may be accepted as an almost unfailing pathognomonic sign, provided the history and palpation point to colonic disease.

4. Radical operation, based upon early diagnosis, may well be successfully performed in patients up to sixty years of age and older, provided their general condition is good.

5. In old and weak patients, timely palliative work by means of a lateral anastomosis will enable us to circumnavigate the establishment of the always objectionable artificial anus, and make unnecessary the seriatim operating, which is unavoidable if the patients reach the surgeon with pronounced tympanites and ileus.

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THE SURGERY OF TUBERCULOSIS OF THE COLON*

By L. L. McARTHUR, M.D., Chicago

BELIEVING that my experiences with tuberculosis of the intestines sustain them, I submit the following propositions:

1. Intestinal tuberculosis is far more frequent than has been, in the past, accepted.

2. Its primary nature in this situation is now admitted to be five per cent by the pathologists, who also claim that twenty-five per cent of all human tuberculosis gains its entrance through the intestinal mucosa.

3. Either the "ulcerative" or the "hypertrophic" type of this disease is (at some time) amenable to surgical interference.

4. That interference should be either by excision or exclusion.

5. That surgical insult in these forms of intestinal disease is better borne than a like degree in any other.

6. That early recognition by the internist and interference by the surgeon would eliminate a large proportion of cases now classified as "tabes mesentarica."

The reopening of the question of the "infectivity of the bovine tubercle bacillus," in 1901, by Koch, in his London address, has done much to make clear the true status of intestinal tuberculosis, while demonstrating the fact that the bovine organism, though less virulent for man than has been heretofore held, does nevertheless occasionally induce *primary* intestinal disease.[1] Moreover, the careful review of the older statistics, and the more exact investigations by the pathologists of the more recent material, has determined quite a revulsion of opinion, both as to the location of the atria through which systemic infection occurs and the relative frequency of the same. Until recently we have been content to believe that the vast majority of cases of human tuberculosis occur through the respiratory tract. At present, based on statistics that have been obtained since those newer refinements of pathology — bacteriology, inoculation, and the microscope — were available, we are driven to the conclusions, that the intestinal atrium is far more frequent than we have in the past accepted;[1] that nearly 50 per cent of all autopsied children dying before the age of ten have the disease; and that the atrium is through the intestinal wall in over 21.2 per cent, and primary in 4.9 per cent. (Lubarsch.) The relative proportion between the respiratory and intestinal tract is shown in the following table.

	Respiratory	Alimentary
Carr	75.2%	19.0%
Kossel	59.0%	4.5%
Hof	56.2%	25.1%
Still	55.9%	25.5%
Nebelthau	34.6%	19.2%

Some authorities even go so far as to say that *the majority* of all cases of tubercular infection take place through this route. (Brandenburg.)

Since Eisenhardt found 56.3 per cent of all consumptives, as determined by 1,000 post-mortem examinations, to have intestinal tuberculosis, since the latest reports show a fair percentage (15 per cent) of *primary* intestinal tuberculosis among children, and since we are now observing implantation tuberculosis occurring in such inflammatory fields as occur in appendicitis, gall-bladder perforation, and stomach ulcer, this subject takes on an added interest to the surgeon.

Tuberculosis manifests itself in the intestine in two forms—the "ulcerative" and the "hypertrophic"—a description of which is deemed unnecessary.

It will always be a surprise that individuals

[1] Furst, in his most painstaking review of the question of tuberculosis (made necessary by the doubt thrown on the existing teachings by Koch's denial of the identity and dangers of the bovine tubercle bacillus), demonstrated that the number of cases of *primary* intestinal infection was much larger than had been heretofore believed, by collecting the histories of one hundred and sixty cases, undoubted and well authenticated. Many of these cases collected by Furst were shown to be in all probability due to the bovine organism. Such authorities as Orth, Ganghofner, Baginsky, Demme, Kossel, Klemperer, Lubarsch, were quoted in substantiation of this claim.

[1] Villemin and Klebs in the earlier days, Dobroklowsky, Tschitovitch, Baumgarten, Behrens, Furst, and Horbitz in more recent times, have convincingly demonstrated that the bacillus may pass through the intact mucosa, to be arrested in the lymphatics of the mesentery, where they may remain months, years, decenniums, without giving rise to general manifestations. Due to this latency is it that so many cases of primary intestinal invasion have been overlooked. Harbitz, utilizing cultural and inoculation experiments in connection with his post-mortem findings, has proven by these newer methods a far greater frequency than had been accepted; his data showing 22 per cent for the intestinal route.

* Read before the American Surgical Association, Cleveland, Ohio, May 31, 1906.

extremely prostrated with this affection are yet so tolerant of such extensive surgical insults. Insults that in other ailments requiring similar surgical procedures prove fatal, in this bid us hope for still greater successes.

Both of these varieties, in my experience, are amenable, at times, to surgery. The nature of the interference must be determined by the individual case. So many factors will take part in its determination that no set rule can be laid down.

Practically, its surgery divides itself into either *exclusion* or *excision*, the choice being determined by the conditions obtaining in the given case.

The exclusion may be partial or total.

Excision, generally speaking, is more applicable to the hypertrophic variety, and those cases of the ulcerative type, in which the condition of the patient and the area involved does not too strongly militate against it, while *exclusion* is reserved for those cases in whom the extent of the ulcerative area involved or the extreme debility of the patient makes this simpler procedure appear the more advisable.

The term "partial," as here used, is applied to a side-to-side anastomosis of the intestinal tube above and below the diseased area, while a "total" exclusion implies a resection of the bowel-wall above the disease, closure of the distal end, with implantation of the proximal end well below the diseased area.

It is distinctly to be understood that *absolute occlusion* is never practised.

Though the number of cases of tuberculosis of the large intestine demanding surgical interference in my practice has been limited, yet the regularity with which these cases have recovered has made me most hopeful for the future.

I present from my records, cases upon which I have been called to operate, illustrating the points I have desired to emphasize in this communication.

Of the hypertrophic type I have had four—two in the ileocæcal region, one at the hepatic flexure, and one at the transverse colon; of the ulcerative variety, four.

Brief abstracts follow, with the treatment decided on and the points of interest. Of these case histories I select one each for illustration of the surgical points.

CASE 1. Adult male (4), "G," merchant; general health fair; "hoarse for years"; suddenly, at night, seized with severe abdominal pains that simulated, to the family physician, acute appendicitis, who ordered him to hospital. When seen, a movable tumor could be palpated by bimanual examination; slight temperature; no leucocytosis; peristalsis visible.

Diagnosis. Tumor of ileocæcal region, with obstruction. Operation revealed a hypertrophic tuberculosis of the ileocæcal valve. Resection of ileum and ascending colon, with end-to-side implantation of ileum in ascending colon, resulted in prompt recovery. The hoarseness was later demonstrated to be a chronic tubercular laryngitis.

This case, then, illustrates: 1. The fact that "the source of infective elements is not necessarily from a pulmonary cavity"; 2. That the first sign of its existence may only then become manifest when the compensatory hypertrophy of the bowel above the obstruction ceases to be sufficient; and 3. It is an example of the situation where, better than anywhere else, the Murphy button does its most efficient work—an end-to-side anastomosis of the small with the large intestine.

CASE 2. Adult, age 60, O. Y., plethoric, merchant, had enjoyed fair health till last ten years of life. In that time suffered from cholecystitis, with jaundice (from stone), was diabetic, and had had pulmonary hemorrhages, for which he had been sent to California. While there was seen by Dr. J. B. Murphy for a severe cholecystitis with—as later evidences showed—perforation of gall-bladder into colon. On convalescing from this attack, a sensitive gall-bladder region *with tumor* remained. The family physician, Dr. Frank Billings, kept him under treatment until pulmonary cavity had healed, diabetes had practically disappeared, and condition seemed to warrant the interference deemed necessary for the supposed diseased gall-bladder with stones causing progressive intestinal obstructive symptoms. Incision over the tumor came upon a cartilaginous-like hardness of the abdominal wall involving the internal and external obliques and transversalis in the form of a plaque three inches in diameter and half an inch thick. After entering the abdominal cavity, it was possible to determine the tumor to be an hypertrophic tuberculosis of the hepatic flexure of the colon with stenosis. At this point the gall-bladder had drained. No stones to be palpated in gall-bladder.

Treatment. Resection of ileum ten inches from the cæcal valve; implantation of proximal end in transverse colon by button; closure of distal end. Prompt recovery, with restoration to health, and disappearance of tumor until almost impalpable.

Here, in a *plethoric, tubercular, diabetic*, operated upon for chronic gall-bladder disease, it

seemed wisest to be content with exclusion of that portion of the intestinal tract involved.

This case illustrates most convincingly: 1. How a secondary implantation of a tubercular process may be ingrafted on a simple inflammatory one below; 2. How, when the tubercular process lies in contact with the parietal wall, those indurated areas described by Vocht, and since observed by Tillmans and others, develop by a fibrosis similar in character to the hypertrophic changes induced by the same organism in the bowel-wall; 3. How the mere diversion of the fæcal current will often relieve the active process; and finally, how the most unpropitious outlook of diabetes, tuberculosis, and gall-bladder disease in an old and plethoric individual need not necessarily contraindicate even a section of the bowel, with diversion of the fæcal stream.

Case 3. H., adult, male, 40, school teacher, had always enjoyed fair health; had an acute appendicitis, for which he was operated in a neighboring city, appendix being removed. Fæcal fistula followed. He was reopened after eight weeks and perforation in bowel closed. This failing, two months later he was brought to the writer. Examination of curettings of the granulations lining the sinus revealed tuberculosis. Patient was prepared for intestinal resection, if found necessary. At operation, several small openings in cæcum found; enlarging same revealed tubercular ulcers throughout cæcum and ascending colon. Patient being in otherwise good condition, resection was determined on. Ileum resected three inches from valve, and colon ascendens half way to hepatic flexure. Before inverting colon end for closure, inspected to see if in healthy area beyond ulcers. Finding ulcers still very numerous, removed hepatic flexure and half the transverse colon. Closure of end of colon, end-to-side implantation, by button, of ileum. Recovery, with slight fistula until a silk suture was discharged. Patient gained immediately in health and returned to superintendency of school in Colorado, where he has continued in good health.

This case seems to illustrate the type of intestinal tuberculosis for which Benoit has proposed the term "appendicitique," so closely may it simulate that disease, while for the other he suggests the term "neoplastique"; 2. That the removal of the major portion of the diseased area may result in a cure; 3. That removal may at times require extensive resection of both small and large intestine.

No cavity found in lungs at time of operation.

Case 4. T., young, healthy man, age 20, while visiting the World's Fair in 1893 was seized with such severe abdominal pains that he had to be removed to the emergency hospital on the grounds. Here his perforated appendix was removed by Dr. John E. Owens, and the infected area drained. A fæcal fistula followed, which failed of cure by Dr. Owens at a secondary operation. With change of service, case was transferred to me. In making the third operation to close the distressing fæcal fistula, I found several perforations of the caput coli that were evidently tubercular. Enlargement of them for inspection of interior of cæcum revealed several other ulcers, so excision was made of ileocæcal region with enlarged lymphatics at ileocæcal junction. End-to-side implantation of ileum, into ascending colon, button, recovery. Two years later I learned of his death in the woods of Minnesota, whither he had gone for a pulmonary tuberculosis which was not discovered, if existing, at the time of operation.

I am of the opinion that this was a case of implantation tuberculosis on an inflammatory area in the stump of an acute appendicitis, either from the food or milk, with subsequent spreading to the lungs, as has been demonstrated by Baumgarten, Behring, and others to occur when the primary focus is in the intestines, and is in consonance with the most recent expert pathological findings. (See footnotes, *ante*.)

Case 5. A robust child of 10 had such a mild acute appendicitis as, in the opinion of Drs. A. Bevan, Cary, and Frankenthal, not to require operation. All the classical symptoms, with small tumor formation on second day in cæcal region. Subsidence of the febrile movement at the end of ten days, but some persistence of the induration. After six months in the country, patient was examined by Christian Fenger, who offered the opinion that the persisting tumor was a granuloma. Child did not thrive, tumor increased in size, nodes to be felt in the mesentery, evening rise of temperature, loss of appetite, and progressive emaciation. Diagnosis ultimately made of an abdominal tuberculosis by Drs. Bevan and Billings. With the intestinal obstructive symptoms growing worse, laparotomy by Dr. Bevan demonstrated general abdominal tuberculosis of peritoneum (with the nodes of bovine tuberculosis), omentum, intestines, mesenteric glands, and hypertrophic stenosis of the ileocæcal region. Conditions did not seem to warrant anastomosis, so abdomen closed. Patient left hospital in two weeks. Consultants advised: 1. X-ray; 2. Change of climate; 3. Absolute rest; all of which were carried out simultaneously at El Paso, Texas, with distinct improvement of all except the obstructive symptoms. These, growing progressively worse, became total in nine months, and made it absolutely imperative to reopen for anastomosis. This I did. On reopening, the *only evidence remaining* of the former tuberculosis was a hypertrophic tumor of the ileocæcal region. Ileum enormously dilated, descending colon atrophic; peritoneum smooth. Side-to-side anastomosis of ileum with sigmoid. Relief of the ob-

structive symptoms, with prompt recovery of the patient. A restoration to health by the gain of a pound a day for the first thirty days, after which a steady increase in size and weight.

The points in this case are: 1. The implantation of a tuberculosis on a mildly inflamed appendix, perhaps from the milk of a tubercular cow, on later investigation thought to exist in the herd of cattle, the source of her milk while in the country; 2. The complete subsidence of of same under the systematic combined use of laparotomy, rest, X-ray, and change of climate, leaving behind the fibrous stenosis of the ileocæcal valve, for which, 3. Lateral anastomosis of the ileum and sigmoid proved a perfect relief, by exclusion of the entire colon; 4. That here the entire course of an abdominal tuberculosis which had been watched throughout all its stages, both clinically and by operation, encourages the hope that the time may yet come when operative interference for abdominal tuberculosis will be made before it has advanced to a tabes mesenterica; but even then the case may not be hopeless, especially if we can eliminate by our interference the infective focus.

THE SERUM-THERAPY OF TETANUS [1]

By C. A. PORTER, M D., Boston, Massachusetts

IN order to avoid discussion of the scientific side of my subject, which will be presented with so much greater authority by Dr. Pease, and a repetition of the statistics assigned to Dr. Jacobson, to whom I have sent the Boston cases of tetanus, I shall limit my paper to a brief discussion of the use of serum in cases in which tetanus has developed where no prophylactic injections have been made. In order to make intelligible, however, the indications which any method of treatment must attempt to fulfill, I will very briefly summarize the most recent conclusions as to the manner in which the tetanus toxins spread through the body of the infected individual.

Our present knowledge of tetanotoxin, obtained by countless experiments upon the lower animals, is certainly one of the most striking examples of the wonderful results of modern scientific methods. Though a few links are missing in the chain of evidence, enough is known, I think, and proved true beyond reasonable doubt, to justify the statement that a logical treatment of tetanus by serum is at least in sight. We can also, in part, explain the hitherto baffling discrepancy between the highly satisfactory use of the serum in laboratory experiments, where results can be foretold with almost mathematical accuracy, and our frequent disappointments at the bedside. In a recent and most excellent paper by Dr. N. Tiberti of Florence, published in the *Centralblatt für Bacteriologie*, 1905, the succeeding steps of the discoveries of the dissemination of tetanotoxin throughout the body have been described. Of the names associated with the subject of tetanus — Kitasato, Behring, Brunner, Gumprecht, Goldscheider, Kartulis, Nicolaier, Oppenheimer, Vaillard and Vincent, Wassermann, etc.— most credit, perhaps, for work upon the manner of the transference of tetanus toxins through the body should be given to Marie and Morax, and to Meyer and Ransom.

Briefly put, our present knowledge is as follows: Tetanus toxin, by diffusion from the local lesion,— *first*, enters the motor nerve plates of the adjacent muscles, passing thence WITHIN the axis cylinders of these motor nerves upward to the motor ganglia in the cord; *secondly*, by lymphatic absorption it enters the general blood current, where it remains until it is excreted or destroyed, or is carried to all the muscles of the body, to be absorbed through their motor plates. This centripetal passage of the poison occurs in response to a very powerful affinity between the toxins and the higher central ganglia, which is

[1] Read before the American Surgical Association, Cleveland, Ohio, May 30, 1906

not satisfied until a stable union of cell and poison has been formed, often only to be dissolved by death. This fact, that tetanospasmine, wherever and however introduced into the circulation, always makes for the central motor ganglia, combined with the probability that *tetanus antitoxin, unless directly introduced into nerve tissues* (whether given subcutaneously or intravenously), *never reaches these ganglia at all*, or else in insufficient amount to be of value, gives us our most important concepts for a rational treatment of the disease. Of almost equal importance with these is a thorough recognition of the fact that antitoxin ascends the axis cylinder more slowly than the toxin, and that, in order to be efficacious, it must be introduced at a higher level than the toxin and before a stable union of nerve and poison has occurred. Though further knowledge may necessitate some modifications in these statements, there is ample evidence to justify our treatment, for the present, along these lines.

Our indications for treatment, then, are these: 1. To anticipate the centripetal course of the toxin by an immunizing injection at a higher level; 2. By local injections of antitoxin, to neutralize the toxin at its upper limit of advance; 3. By intravenous or subcutaneous injections, to neutralize all circulating toxins; 4. To prevent or retard, so far as possible, lymphatic absorption from the focus, and by local parenchymatous injections, to render the poison inert; 5. By amputation or excision, with germicides, etc., to remove the source of infection when it is possible; and 6. By symptomatic treatment or the newer anæsthetic treatment, cocaine, etc., or magnesium sulphate, to aid the specific serum.

1. If further investigation prove the truth of our present view, that antitoxin, unless injected directly into nerve tissue, never reaches it, the uselessness of cerebrospinal lymph-sac injections becomes obvious. As lumbar puncture has become in the last few years almost a routine treatment in bad cases of tetanus, and as anæsthesia is often required, it is of very great importance to discover the truth about this question, for if subarachnoid antitoxin is no more valuable than subcutaneous injection, it should certainly be abandoned. Scratching the nerves of the corda equina in order that the serum may thus have a point of entrance seems to me too uncertain to warrant its attempt.

Direct injection into the cord was first practised and advocated, so far as I am aware, in a very important paper by John Rogers of New York, published in the *Journal of the American Medical Association*, July 1, 1905. He made several injections, and, so far as he could see, did no harm. These were made in one case between the sixth and seventh cervical vertebræ, in another between the second and third dorsal. He believed that temporary benefit undoubtedly followed this heroic treatment, which, owing to its manifest possibilities of danger, should certainly be reserved for desperate cases. Injections into the low lumbar cord would be less dangerous, and may be used in the graver cases, which do not respond to more peripheral toxin blocking.

Though I can find no mention in literature, and have never put the idea into execution, I would like to suggest the possible value of antitoxin injections into the higher peripheral motor nerves, which would obviously be less dangerous than injections into the cord. The antitoxin would thus be carried to the motor tract at the highest possible level. I recommend a trial of injections into both hypoglossal nerves, perhaps also into the spinal accessory, which treatment should be repeated at short intervals. With the same object in view, would it not be possible that intraneural injections into the brachial plexus might be of use to check toxins ascending from the lower limbs or reaching the motor ganglia from the body muscles?

2. As toxin is always found in the motor nerves of the affected part, there can be little question that intraneural injections, as near as possible to the cord, are clearly indicated, and with either general or local anæsthesia are not very dangerous. We must always bear in mind that toxin travels faster than antitoxin, and that injections at a low level are very much inferior to those made at a high level. The nerves of the brachial plexus or those in the axilla, or the anterior crural, sciatic, and obdurator, should be isolated and filled with antitoxin to twice or three times their normal size at several points. Care should be taken

to inject directly into the nerve, and not into the perineurium. The question of the repetition of these injections will depend chiefly upon whether the original source of supply of toxin has been removed or not, and upon their control of symptoms. After two or three injections into the nerves, in cases in which the original source has been destroyed, it is an error, I think, to continue subcutaneous or intravenous injections of antitoxin; for they are useless and harmful, the symptoms, if they persist, being due to toxin already in the cord beyond the reach of antitoxin injected OTHER than into the cord itself. Temporary loops of gauze tape placed about the nerves greatly facilitate their withdrawal from the wounds for subsequent injections.

As we know with the greatest certainty that the integrity of the axis cylinders is essential for the centripetal passage of the tetanotoxin from the limb, it follows that whatever will break this continuity will absolutely block further absorption from the member supplied by the nerve. I would suggest the advisability, in certain cases, of *nerve section*, in place of amputation, with the hope that a secondary suture might be successful if recovery ensued.

3. While immediate use of intravenous and subcutaneous antitoxin injections is all-important at the outset, and while these injections should always be continued so long as there is any possibility of a continuous absorption from the wound, the limitations of such treatment from a theoretical standpoint are equally obvious and are confirmed by clinical experience.

4. As a considerable amount of the poison is transported through the lymphatic system, it follows that any check to such absorption would be beneficial; for example, as most of the lymph from the extremities is returned to the body by lymph-vessels *superficial* to the *deep fascia*, Bier's passive hyperæmia treatment would certainly diminish toxin absorption. If, instead, the limb was circumcised down to the deep fascia, and the peripheral tissues were soaked with antitoxin, given both subcutaneously and into the muscles, it would seem that no more toxin could reach the general circulation. If the limitations of antitoxin given subcutaneously or intravenously are realized, and patients with acute tetanus are treated along the lines which I have just outlined, we would expect a distinct improvement in the symptoms or in the mortality over the older cases. Though the clinical experience with intraneural or intraspinal injections is limited, so far as I am aware, to eighteen or more cases, it is the opinion of the surgeons who have reported them that this expected improvement in the results has been demonstrated.

In closing, I should like again to emphasize my conclusions as to a rational use of serum in acute or severe subacute tetanus. While some of the details upon which it has been founded may subsequently require change, such a consistent method of attacking the tetanus toxins, resting, in the main, upon well-founded experiments, has the merit of simplicity. In carrying out this treatment we should picture to ourselves the toxins traveling along the motor nerves of the affected part, ever upwards toward the highest motor ganglia and also by absorption through the lymphatics, entering the general blood current, to be brought *indirectly* to the central ganglia through the motor nerve endings of the rest of the skeletal muscles. Antitoxin, to be effective, must reach the poison before it has entered the motor tract, or must, by direct injection into nerve tissues, immunize them in anticipation of the arrival of the aftercoming toxin.

Treatment. 1. Immediate intravenous and subcutaneous injections to neutralize circulating toxin.

2. Immunizing or neutralizing injections at the highest level which the severity of the symptoms appears to justify; directly into the cord, as advocated by Rogers, or into the higher motor nerves, such as the hypoglossal and spinal accessory, as suggested by myself.

3. Peripheral intraneural injections as near to the cord as possible. Where amputation is not indicated or allowed, there is positive experimental evidence that nerve section will isolate the toxins in the limb.

4. Lymphatic absorption will be diminished by the application of Bier's principle of passive hyperæmia or by circumcision of the limb.

5. Parenchymatous injections, *especially into the muscles*, may be found of distinct value in addition to subcutaneous and intravenous injections.

6. If possible, the local focus should be thoroughly eradicated.

7. We have no right to neglect symptomatic treatment.

8. Animal experimentation gives us no ground for hoping that any treatment whatever can be successful, when once the disease has progressed beyond a certain stage.

DEPARTMENT OF TECHNIQUE

A NEW METHOD OF UTILIZATION OF THE SAC IN THE RADICAL CURE OF HERNIA[1]

By ROSWELL PARK, M. D., LL. D., Buffalo, New York
Professor of Surgery in the Medical Department of the University of Buffalo

Modern methods of radical treatment of inguinal and femoral herniæ, as at present apprehended, consist essentially in carrying out two principles: 1. The isolation and disposition of the sac; 2. The closure of the inguinal canal; or, in the case of femoral hernia, obliteration of the femoral canal. So many methods have been suggested for these various purposes that I almost hesitate to introduce another. And yet during the past years I have put in practice a method which is, in theory, simplicity itself, and which, it seems to me, has points of advantage justifying its presentation to you. So far as I have learned, it has not been carried out in this way by others before me, and I may therefore, I think, claim it as an original procedure.

The method consists simply in utilizing what is usually entirely dissected away, namely, the sac, and in making of it the suture material with which the canal itself is closed.

Briefly, the procedure is as follows, especially with inguinal hernia: to isolate the sac, then to empty it and to clean it of all superficial fat. It is thus separated from the cord and made to appear as a distinct, separate structure up to the level of the internal ring. My usual procedure for many years has been to penetrate the abdominal aponeurosis at a point opposite the internal ring, with forceps with alligator jaw, made for the purpose, although these are not at all essential. The forceps introduced through this opening are made to appear lower in the inguinal canal and here to seize the end of the sac, and, in the act of withdrawal, pull it after them and thus bring it out at the puncured point. Here I used to twist the sac, ligate the neck, and tack it in place with one or two chromicized sutures. I have now modified the procedure in such a way that instead of cutting off the sac outside the point where it is fastened, I utilize it as a band of suture material, with which a coarse but strong suture is made, binding together the lateral margins of the inguinal canal.

Of course, much will depend upon the thickness and length of the sac. Old and large sacs will be far too cumbersome for this purpose, and short sacs will be too short to serve as sutures when twisted into a cord. These difficulties are easily overcome by either reducing the sac, cutting out a strip which can be used for the purpose in one case, or in the other, lengthening it by a division, such as is illustrated in the accompanying diagram, by which a sac two inches long can be so divided as to furnish a cord five or six inches in length.

Having prepared the sac, or so much of it as is needed for the purpose, it may be now used in two or three ways. One may thread it into the eye of a very large needle, such as is used for carrying the silk by which we manage a chain-saw, or one may use a Cleveland ligature-carrier, passing it through the tissues on either side as if it were an ordinary needle, then grasping the end of the sac and pulling it back through the openings thus made as the instrument is withdrawn. Sometimes I have passed into the end of the sac a silk suture, threading it into the larger needle and making it serve as a means of traction, the procedure varying a little with the density and strength of the sac-wall. Again, in certain cases, that portion utilized may be divided into halves, making, as it were, two tapes, which can be used for making a shoelace suture of the pillars of the ring by either of the expedients just mentioned. When the ends are drawn down at the lower end of the ring, they may be tied and fastened with a suture.

The advantages of this method seem to me to be the following:

1. It affords almost as perfect and complete a method of closure of the inguinal canal as does any other.

2. It utilizes a portion of the sac which would otherwise be quite discarded, and substitutes fresh animal suture of the patient's own tissue for foreign animal material, while, at the same time, under ordinary circumstances, its sterility may be guaranteed.

3. While I have not had opportunity to demonstrate the fact, I think it fair to assume that such

[1] Read before the American Surgical Association, Cleveland, Ohio, May 30, 1906.

tissue so used does not disappear by absorption, as would tendon or other foreign material, but rather is organized and serves as an additional means of strength and security, forming, as it were, a series of bridges or transverse fastenings by which the obliteration of the inguinal canal shall be more securely attained.

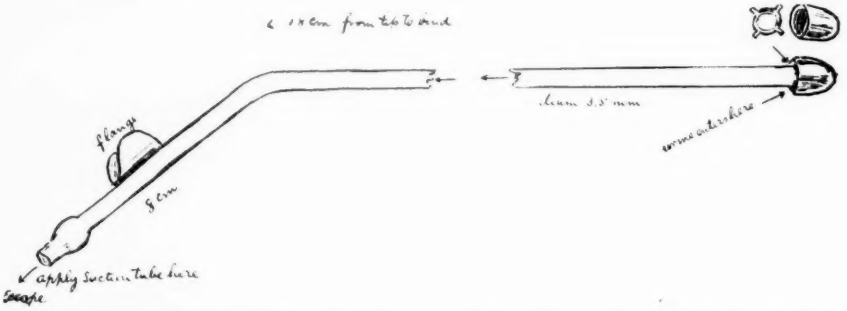
Of course, the method cannot be applied to all cases, and can never be expected always to displace other procedures, nor should one ever think of adopting it when he is not operating deliberately and in the absence of all infectious processes. The same principle, it seems to me, is applicable to many cases of femoral hernia, although here it would necessarily require some modifications.

I have not yet been able to resort to this procedure in a large number of cases, but in those in which I have so far used it, it has given very satisfactory results. Naturally, much time will be required for a final verdict. I would gladly induce my colleagues in the Association to make trial of it as they see fit.

A SATISFACTORY VESICAL EVACUATOR

By HOWARD A. KELLY, M. D., Baltimore, Maryland

For several years past I have made use of an evacuator in order to empty the bladder of the last drop of urine when the patient is in the knee-chest position, which is in all respects satisfactory. The evacuator (see figure) is made up of a tube 18 cm. long in its straight portion, and 8 cm. long beyond the bend. It consists simply of a bent tube 3.5 mm. in diameter, through which the urine is drawn by a suction bulb into a suitable glass receptacle. The inside diameter of the tube is a little over 2 mm. in diameter. The cap which screws on the



end of the tube, as shown in the figure, is used to push down into the vertex of the bladder as the suction is applied, when there is a free and rapid flow from the vesical vertex into the glass bottle held below the level of the bladder. A little flange near the outer end serves to give the fingers a firm hold.

The value of this simple little instrument is twofold; in the first place, it serves to remove any urine which has not been passed or removed by catheter before putting the patient in the knee-chest position. A few drams or an ounce or two of water lying in the vesical vertex may easily prove a source of much annoyance to the examiner — above all, if the patient is not in a good posture. Furthermore, if the operator desires to collect urine from one kidney by means of the ureteral catheter, while at the same time he is collecting the urine from the opposite kidney transvesically by means of a vesical catheter, under these circumstances it is most important to empty the bladder thoroughly just before catheterizing the ureter, in order that the urine which runs into the bladder and then out through the vesical catheter may really represent the kidney not catheterized. Such a method of examining the uncatheterized kidney is always valuable as a means of determining the urea coefficient. It may be valuable, too, for a microscopical and a bacteriological examination, provided the bladder itself is sound.

I present this instrument, because it is better than the one I formerly used, which ended in a little ball perforated with holes; in this the mucosa no longer catches in the openings and thus checks the flow of urine. I think it is better, too, than the little tubes soldered to the inside of the speculum and connected with the exhaust apparatus on the outside.

TECHNIQUE IN CARING FOR THE UMBILICAL CORD AND NAVEL

By T. MITCHELL BURNS, M. D.
Professor of Obstetrics, The Denver and Gross College of Medicine

Five minutes after the child is born, the cord, at the juncture of the skin and amniotic coverings, is tied with a silk ligature (No. 10 or 12 twisted silk, or a doubled piece of knitting silk). The ligature is drawn very tightly, so as to compress the deeply situated blood-vessels. Two inches from the navel the cord is clamped with a pair of hæmostatic forceps (Pean's five-inch, long bite).

The cord is held away from the child's genitals by the hæmostatic forceps, and cut one and a half inches from the navel with an angular pair of scissors. The placental end of the cord is carried by means of the hæmostatic forceps to the Kelly pad.

Wharton's jelly is squeezed out of the cord by grasping the cord near the navel with the fingers of one hand and stripping with the fingers of the other hand. The cord is tightly ligated one inch from the navel, then the ends of the ligature are carried around the cord to the side opposite the knot and tightly tied.

After the child is washed, the cord and navel region are bathed with a saturated solution of boric acid, and wiped perfectly dry. A strip of sterilized gauze of four layers is cut to the size of seven by three and a half inches. In one half of this, at about the center of the junction of the lower with the middle third, a hole is cut and the cord passed through it and laid upward on the gauze. The other half of the gauze is folded over the cord. A piece of absorbent cotton is placed above the gauze and the band applied. Between the band and the genitals a piece of cotton is placed to prevent the urine from soiling the dressing.

Instructions to the nurse are as follows: Each morning the gauze above the navel is to be removed and the cord and navel carefully inspected. If there is any odor, redness, or discharge, the obstetrician is to be informed. Whenever the cotton above the genitals, the band, or the other dressings become wet or otherwise soiled, they are to be changed. If the cord or navel becomes wet, they are to be washed with boric-acid solution, and wiped perfectly dry with gauze or cotton. If there is a slight bleeding from the navel after the detachment of the cord, a little powdered alum is to be applied once a day, and if the bleeding continues for three days, the obstetrician is to be informed.

If the cord does not fall off by the tenth day (we have never seen such a case under the preceding method), it is ligated very close to the navel with a fine silk ligature or a piece of cotton thread twisted and doubled, and the cord cut off.

The preceding method differs from those in general use: 1. In the use of a ligature close to the skin-covering of the cord; 2. In the arrangement of the gauze; 3. In the absence of any antiseptic powder; and 4. In the use of cotton between the belly-band and the genitals.

Our reasons for using these modifications are:

1. The method accords with the general principles of surgery and the treatment of an aseptic wound.

2. The ligation of the cord close to its skin-cuff is similar to the ligation of a polyp, and is done for the same purpose; i. e., to cause early detachment. This ligation tends to prevent any absorption from the cord by the capillary network of blood-vessels which extend into the cord a line or two beyond the skin-cuff. The usual ligation does not tend to aid detachment of the cord or prevent absorption from the cord.

3. The hæmostatic forceps are used because their application requires less time than the tying of a ligature.

4. The arrangement of gauze makes a smooth dressing which does not ruffle or become attached to the cord, and allows the cord to be easily inspected.

5. The use of the sterilized gauze and the absence of powder facilitates the desiccation of the cord, and does not predispose to infection.

6. The use of the cotton between the abdominal binder and the genitals tends to prevent soiling of the cord dressings.

7. The cord on the first or second day is dry and flat, and at times transparent — the blood-vessels showing distinctly through the cord — and on the third, fourth, or fifth day, or, rarely, on the sixth, seventh, or eighth day, the cord become detached.

8. All nurses who have used this method of dressing the cord consider it better than any other method they have used.

9. This method has been used with the very best results in the last one hundred cases attended by the author, and no harmful effects have been noticed.

TRANSACTIONS OF SOCIETIES

AMERICAN SURGICAL ASSOCIATION

PROCEEDINGS OF THE ANNUAL MEETING, HELD AT CLEVELAND, OHIO, MAY 30, 31, AND JUNE 1, 1906

The President, DR. ALBERT VANDER VEER of Albany, New York, in the chair.

The first order was the delivery of the President's address, by DR. A. VANDER VEER of Albany, New York. (See paper, p. 242.)

PROF. F. TRENDELENBURG of Leipzig, Germany, read a paper on SURGICAL TREATMENT OF EPISPADIA AND ECTOPY OF THE BLADDER.

DR. GEORGE E. ARMSTRONG of Montreal, Canada, read a paper entitled SURGERY OF THE LARGE INTESTINE. (See paper, p. 278.)

DR. WILLY MEYER of New York read a paper entitled CANCER OF THE COLON, WITH SPECIAL REFERENCE TO ITS DIAGNOSIS, TYPES OF OPERATION, AND METHOD OF AVOIDING FÆCAL DROWNING. (See paper, p. 309.)

DR. LEWIS L. MCARTHUR of Chicago contributed a paper entitled THE SURGERY OF TUBERCULOSIS OF THE COLON. (See paper, p. 321.)

DR. CHARLES H. MAYO of Rochester, Minnesota, read a paper entitled CANCER OF THE SIGMOID AND RECTUM. (See paper, p. 236.)

MYOMATA OF THE LARGE INTESTINE

DR. W. L. ESTES of South Bethlehem, Pennsylvania, said that true myomata of the large intestine are almost unknown. So-called myomata of the large intestines are histologically fibromyomata, and they are practically always fibroleiomyomatas.

The rectum is the part of the large intestine which, in the great majority of the cases, is involved, although there are a few cases on record of myomata of the cæcum, and of the ascending and the descending colon.

Dr. E. Lexer of Von Bergman's clinic has classified myomata, and he has collected the largest number of cases the writer has seen. Lexer makes three groups of these tumors, as follows:

Group 1. Tumors which grow in the lumen of the gut. These appear as pedunculated, roundish, or polyp-like tumors, of rather hard consistency, covered with mucous membrane. They may be removed by way of the anus. The pedicles should be ligated and then cut through.

Group 2. Tumors which grow by a pedicle from the outside walls of the intestine, and which, by their bulk, impinge upon and may produce almost complete stenosis of the gut by their gradually increasing pressure. This class may involve any part of the large intestine, but the tumors are chiefly found in the upper part of the rectum. These require a laparotomy for their removal.

Group 3. Tumors which grow from the rear of the rectum, and which, by their bulk, push the rectum forward and fill up the cavity of the pelvis. These tumors are easily mistaken for ovarian tumors, and other common tumors of the pelvis. They require sacral exsections or parasacral incisions for their removal.

The writer suggests the possibility of another or fourth group. Tumors in this class result from inflammations. While they are really hyperplasias, they may, but very rarely, develop as circumscribed tumoid masses in the walls of the gut, which by persistent hypertrophic thickening may cause stenosis of the gut. The sigmoid flexure is the part of the large intestine involved by this class of tumors.

The writer gives the history of a very remarkable case of stenosis of the sigmoid flexure, which resulted from enormous and symmetrical hyperplasia, chiefly of the muscular coats of the gut, which formed a well-marked tumor of the intestine. The intestine was strictured, almost entirely closed, within the area of the tumor, not above it, nor below it, and the stenosis was produced by the bulk of the hyperplastic muscular layer. Histologically, it was classed by the pathologist as a myofibroma.

Prof. J. Rotter, in a monograph on *Inflammatory Strictures of the Sigmoid*, gives credit to Graser, and quotes his (Graser's) investigations and conclusions as to the pathological steps involved in the production of ordinary inflammatory strictures of the sigmoid.

These writers do not explain any development such as that which occurred in the writer's case, nor do they furnish any case of well-marked symmetrical tumor that was produced by the inflammatory conditions they described. The writer has not been able to find any mention in surgical or pathological literature of a case similar to his.

He believes, therefore, that his case is a very rare one, and that it indicates the possibility of a fourth class of tumors of the large intestine, which belongs to the myomatous groups.

These tumors require a laparotomy for their removal. On account of the very numerous and dense adhesions, the operation for their removal is an extremely tedious and difficult one.

Dr. Arthur T. Cabot of Boston read a paper on Inflammations about and Displacements of the Sigmoid.

Dr. W. Joseph Hearn of Philadelphia, Pennsylvania, reported a case of resection of the sigmoid flexure of the large intestine, and one and a half inches of the fundus of the bladder, for carcinoma, with recovery of the patient.

Dr. Lewis S. Pilcher of Brooklyn, New York, followed with a paper entitled Technique of Extirpation of the Rectum; Technique of Ablation of Hemorrhoids.

Dr. Joseph C. Bloodgood of Baltimore read a paper entitled The Surgery of Carcinoma of the Upper Portion of the Rectum and the Sigmoid Colon. (See paper, p. 284.)

DISCUSSION

Dr. N. B. Carson of St. Louis, Missouri, exhibited a specimen which demonstrated that a foreign body may enter the alimentary canal, pass through the entire length of the canal until it reaches the lower end of the sigmoid flexure, and there produce its results. The specimen was a small piece of the breast-bone of a quail. The patient suffered from complete intestinal obstruction, so that her condition seemed unfavorable for operation. The members of the family and the patient insisted upon an operation, and in opening the abdomen he found the seat of the obstruction to be in the large intestine, and in passing his gloved finger along the lower end, just at the sigmoid, where the colon becomes the rectum, it met with a sharp body, which passed through the glove, caught in it, and held it while he passed a forceps and removed the foreign body, which had resulted in complete obstruction of the bowel, followed by general peritonitis and death.

Dr. Joseph Ransohoff, in speaking of Professor Trendelenburg's paper, said that in cases of ectopy the greatest difficulty was to get continence; but another difficulty was to secure enlargement of the bladder. In these cases, by bulging the posterior wall of the bladder the bladder can be pushed back into the abdomen for a considerable distance. In an adult case he succeeded in increasing the size of the bladder by making a laparotomy before doing anything else, getting the bladder, and sewing it to the anterior wall of the abdomen and establishing a pocket under the abdominal wall. He increased the size of the bladder, and reduced the size of the hernial aperture through which the posterior wall protruded. While he did not succeed in effecting a complete cure, the bladder was larger, and was able to contain more by the device for avoiding pressure than it formerly did.

Dr. W. W. Keen of Philadelphia asked Professor Trendelenburg two or three questions. He said that his (Trendelenburg's) remarks in regard to molding the infantile pelvis so as to approximate the margins of the pubic bones have suggested a question. It would answer very well with boys, but in the case of girls the question arises whether it has been tried sufficiently long for such patients to have reached the age when they may possibly have been married, and whether it would produce such a deformity of the pelvis as to be a serious matter should they become pregnant.

In the next place, he would like to know whether the loosening of the ilium about the sacroiliac synchondrosis impairs in any degree the stability of the march of the patient. He does not know to what extent this procedure was carried, but if the bones were far separated, it would seem to him it might impair the ability of the patient to walk.

In the third place, he would like to ask whether, if this second condition should occur, it would not be possible, by making a division of both the horizontal and descending rami of the pubes, to approximate the two margins of the pubic opening to such a degree as to get the desired effect wished for, and yet, at the same time, not interfere with the stability of the patient's walk.

He called attention to one case of his own which he thinks shows very remarkably and in the most encouraging manner the ability of the rectum to answer as a bladder. The case is reported at length in his book entitled *The Surgical Complications and Sequels of Typhoid Fever.* It was a patient who, after thirteen operations by his colleague and himself, finally, in 1876, had this operation done and this condition completely established. The patient's husband had died of typhoid fever, during which attack she had nursed him and contracted the disease. During the disease, large vesicovaginal and rectovaginal fistulæ developed, and persisted even after repeated operations were performed to close them. He finally dissected out her urethra and closed the vulva entirely, after explaining to her what would be the outcome. She was near the change of life, was not well favored, and had not, therefore, a very remarkably good prospect of a second marriage. She accepted the oper-

ation, and he closed the vagina entirely, having resected the urethra. In consequence of that, the menstrual flow passed through from the vagina into the rectum, through the rectovaginal fistula, and all of the urine passed through the vesicovaginal fistula, at first into the vagina and then through the rectovaginal fistula into the rectum. For twenty-two years the history of this woman was known to him. Some fifteen years after the operation she came to him complaining of difficulty of micturition, and this he found to be due to a small calculus that had formed in the vagina and had acted like a ball-valve, preventing the urine from finding its way into the rectum. It was easily crushed by a curved hæmostat forceps introduced into the anus. The rectum in this woman's case for twenty-two years acted as a bladder and receptacle for menstrual fluid and for the ordinary fæcal contents of the rectum. She arose once or twice at night, but never had any trouble or irritation, and there was never the slightest indication of an ascending irritation or inflammation from the ureters up into the kidneys. Where a portion of the bladder is resected and transplanted into the rectum, as has been done by a number of surgeons, notably, in this country, by Van Hook, there have been a number of cases in which ascending infection has followed, but in this case there was no infection whatever, and it is certainly encouraging to know that for at least twenty-two years the rectum served its purpose well.

In reference to the other papers regarding the removal of various tumors, and especially carcinoma of the rectum, he called attention to a technique which he put into use some years ago, and has been followed with great advantage; namely, he has done a preliminary colostomy. He prefers decidedly an inguinal anus to a sacral anus, because it is so much more readily kept clean, and because by no possibility can a bandage be so applied as to produce such pressure that it is perfectly bearable to keep the contents of the rectum within it; whereas a bandage around the abdomen can be so applied with perfect ease. In the next place, he has closed absolutely the lower end of the rectum, so that there is no opening in the perineum whatever. Preceding the colostomy opening, the fæcal contents from above pass through the clean opening, and the slight mucus which accumulates between the colostomy opening and the closed lower end of the rectum will find its way by reverse peristalsis also through the same opening.

He said Dr. Mayo referred to the point that before operation we do not know how extensive the disease is. In cases where the upper border of the disease was beyond the reach of the finger, the speaker has utilized the colostomy opening, inserting a proctoscope into the lower end of it and inspecting the mucous membrane of the bowel through its lumen, and also, at the time of operation, investigating by the finger the external surface of the lower portion of the bowel.

Dr. Taylor is cognizant of two cases of resection of the rectum in which at least from twenty-five to thirty-seven centimeters were removed, in which the diagnosis of carcinoma is thoroughly established, not only by microscopical but also by clinical examination in one case, by such competent observers as Weir of New York, and Sinclair and J. C. Wilson of Philadelphia. Both of these patients are alive to-day, after fourteen years.

Dr. M. H. Richardson of Boston, referring to the President's address, recalled a case of cancer of the breast and a different form of malignancy in the uterus in one patient at the same time.

He thinks that in cases of infiltrating cancer surgeons should not try to operate on the lower bowel. The same rule should apply to the large intestine. He recalled two cases of tumor of the large intestine — one of his own and one operated by Dr. Mixter. Both operations caused intussusception. His patient died, while Dr. Mixter's recovered.

Reference was made to idiopathic cancer of the colon as described by Fitz. He recalled three such cases, all of which were cured by resection and suturing.

Surgeons should be on the lookout for actinomycosis in these malignant cases.

Dr. William B. Coley of New York City recalled two cases illustrative of the duality of carcinoma and sarcoma in the same patient. The first case, which was reported to the New York Surgical Society eight years ago, was one of typical carcinoma of the breast in a woman, 45 years of age, who was operated on twice, he himself doing the second operation. Three months after the second operation, a tumor developed in the submaxillary glands. It grew rapidly, was about the size of a walnut at first, and was examined microscopically by two or three pathologists, who pronounced it non-malignant, although, in his judgment, it had the aspects of malignant disease, and was pronounced sarcoma clinically. It recurred in three weeks. He operated, and expressed the firm conviction that it was sarcoma. The tumor, after a careful microscopical examination by Drs. Buxton and Dunham, was pronounced a round-cell sarcoma. A photograph of the case was published in the *Annals of Surgery*. In about three months the tumor had attained the size of two or three fists.

The second case was one of sarcoma of the abdominal wall, operated by Dr. McBurney and Dr.

Tuttle at the Roosevelt Hospital eleven years ago. The patient came to the speaker two years ago with a typical carcinoma of the breast, which he removed.

Dr. Charles B. Nancrède of Ann Arbor, Michigan, stated that three years ago he removed a breast for carcinoma, and the report came from the professor of pathology that it was carcinoma. One of his assistants, in amusing himself with the growth, found, to his surprise, typical sarcomatous tissue. He submitted it to the pathologist with the statement that it was undoubtedly sarcoma. The pathologist finally admitted, after further e amination of the specimen, that there were evidences of both sarcomatous tissue and epitheliomatous malignant tissue in the breast.

Dr. Roswell Park of Buffalo, New York, in speaking of cases of ectopy of the bladder, suggested a modification of the Maydl principle of transplanting both the ureters into the appendix. He said the cases that would admit of doing this would be quite unusual, but it is a suggestion that might be carried out. He has had it in mind in a case which he expects to operate upon in a few days for inoperable cancer of the bladder. The bladder, the urethra, and the rectum are involved. The case has now reached the point of desperation, so that he thinks the suggestion of transplanting the ureters into the appendix might be carried out.

He reported a case illustrating the unexpected sequel of colostomy in a bad case of tubercular ulceration of the rectum. He made a colostomy for physiological rest of the rectum. Having lost track of the patient for two or three years, when he saw him again he found an unexpected condition of affairs. After divesting the patient of the apparatus he was wearing, there came out through the colostomy opening about fifteen inches of prolapsed colon by measurement. It simply fell out, and dropped down alongside of the pelvis and thigh. He had not thought it possible that there could be such a degree of mobility of the prolapsed colon after such an operation. It was the most extreme case of the kind he had ever seen.

Dr. Nathan Jacobson of Syracuse, New York, stated that his experience with the combined method for the removal of carcinoma by the sacral route has been so satisfactory that he is hardly prepared to abandon that operative procedure. He has preceded his operation by a colostomy. He has operated by the modified method suggested by Bardenheuer. As to the Kraske operation, he has opened up the peritoneum freely, has gone very high through this route, and his operations have been satisfactory. Two of his patients are living now who were operated on, one over twelve years ago and one nine years ago. He presented a specimen of the latter case, a large carcinoma of the rectum, at the Buffalo meeting, six inches of the rectum having been resected. This was nine years ago, and the man is still alive. He weighs fifty pounds more than at the time of operation.

In another case, that of a woman operated on five years ago, he resected a good share of the vagina with the rectum. In none of these cases has there been fæcal fistula through the sacral wound. His experience has been that if we make a free section of the posterior wall of the rectum at the time of the operation, and allow for the time being the discharge of fæces through the posterior opening, we save union between the anal stump and the proximal end. If this is not done, the stitches will tear away and a large fæcal fistula follow. He looks upon that as an essential feature of the operation.

Dr. A. G. Gerster of New York City said, although we could not deny the advantages of the combined method in many cases of highly situated carcinoma in a locality where the cancer and sigmoid flexure joined, especially in the female, the perineal route has great advantages. In the male sex, if proper preliminary steps are carried out, this method is excellent and yields good results.

In 1884 he operated on a patient, removing eleven inches of the rectum, for carcinoma. The diagnosis was confirmed by a pathological examination. Two local relapses followed, for which the patient was operated. The man was well to-day. Another patient was operated on seventeen years ago. In this case, thirteen or fourteen inches of the rectum was removed, and the patient is still living. In these two cases the speaker said the good results were not due, in his judgment, to the operation alone, but largely to the fact that the tumor was not very malignant.

Mr. Charles A. Ballance of London, England, in discussing the President's address, said he is one of those who believe that before long we shall be able to establish the fact that sarcoma and carcinoma are due to a microparasite. He said it is not difficult to understand that sarcoma and carcinoma may occur in different members of one family or even in the same individual. He referred to an address by Sir James Paget, who pointed out that different kinds of galls are produced by the same insect, and the difference in the class depends upon the different site or position. If we hold the theoretical considerations which link carcinoma and sarcoma with diseases that are parasitic, making us believe that that disease will ultimately prove to be due to a micro-organism, we can easily understand how this organism of cancer, lighting upon mesoblastic tissue, may produce a malignant sar-

coma; while if it lights upon an analogous epithelial cell, it will produce a carcinoma, so that the difficulty represented in the paper of the President fades away before the vision, seeing that he holds that this disease will ultimately prove to be due to a micro-organism.

Dr. Archibald MacLaren of St. Paul, Minnesota, said that surgeons are all agreed that cancer of the rectum should not be considered wholly inoperable, except in a small minority of cases. He doubts whether extirpation of the glands is going to improve the results, although surgeons are all anxious to know how much may be accomplished along that line.

As to the possibility of extirpating cancer of the rectum within finger-reach of the anus, in the last year he has been able, by simply removing the coccyx, to bring out as much of the sigmoid as one could wish, to extirpate six inches of the rectum, strip the mucous membrane from the sphincter, pull the bowel to the skin edge, and attach it. He has had two excellent functional results, with perfect control for a limited length of time. Whether there will be recurrence or not, only time will tell.

Professor Trendelenburg, in replying to the remarks made by Dr. Keen, said that while he never saw a woman become pregnant after the operation he had described, he was sure there would be no difficulty attending that condition. The two valves were not closed together, and the woman was in the same position she would be after a symphyseotomy.

As to the second question, there is no impediment in walking by loosening the ilium at the sacroiliac synchondrosis.

Mr. Charles A. Ballance of London, England, by invitation, contributed a paper entitled Some Observations on Intracranial Surgery. (See paper, p. 223.)

DISCUSSION

Dr. Dudley P. Allen of Cleveland, Ohio, asked Mr. Ballance if he was to be understood as saying that no case of aneurysm in the interior of the skull had been diagnosticated before death.

Mr. Ballance said he expressed the opinion that no surgeon had heard the murmur of a true aneurysm within the skull.

Dr. Allen (resuming) said that some fifteen years ago a country practitioner, some forty or fifty miles west of Cleveland, telephoned him that he had a case of aneurysm in the interior of the skull. He wondered how this practitioner had diagnosticated it. Dr. Allen arrived in the night. He had forgotten the details of the case, but a bruit could be heard very distinctly over the left side of the skull. He ligated the internal carotid on that side, but the patient became worse and died. They found the aneurysm on the left side of the circle of Willis, just where it had been diagnosticated.

Dr. N. B. Carson of St. Louis, Missouri, referred to a case of aneurysm reported by Dr. Willis P. King, at a meeting of the Missouri State Medical Association in the early nineties. In this case a diagnosis of cerebral aneurysm was made. The bruit was heard by placing a tube in the ear of the patient and one in the ear of the physician. The diagnosis was confirmed by post-mortem examination.

Dr. John F. Binnie of Kansas City, Missouri, referred to another case of aneurysm reported by Dr. John H. Thompson before the Missouri State Medical Association. In this case a very distinct bruit could be heard by placing a tube in the patient's ear. He heard the bruit himself in this case.

Dr. W. W. Keen, in speaking of intracranial aneurysm, said he has operated on two cases of arteriovenous aneurysm. One of them he operated on in Chicago a number of years ago, and the patient recovered. A bruit was perceptible both in the head and neck. The second case was operated on at the Jefferson Hospital two years ago. In that case he was obliged to tie both carotid arteries, a cure not having been effected by the ligature of one common carotid, and the patient died as a result of the second ligation.

He was particularly interested in what Mr. Ballance said in reference to brain abscess, and he has had two cases recently that illustrate the point Mr. Ballance made in reference to the stalk of the abscess. Both were traumatic cases. One was a very unusual case in origin, and most satisfactory in its conclusion. It was that of a young man in North Carolina, who, last July, was standing alongside of a revolving belt connected with some machinery. The ends of the belt were connected by means of metallic hooks, one hook at each end, making almost an interrupted ellipse. One of the hooks was poorly tempered, and straightened out, and a free end of the rapidly revolving belt struck the patient above the right ear. The patient recovered from the wound. There was no X-ray apparatus available to determine whether the bent hook was present, or if present, where it was, and as the surgeon probed for it and did not succeed in finding it, he closed the wound, and the patient recovered. Toward the end of the year the patient began to suffer from epilepsy. Two epileptic convulsions occurred in the month of March, and, in addition, the patient became hemiplegic on the left side. As soon as he was brought to Jefferson Hospital an X-ray picture was taken,

which showed the presence of this bent hook with one end almost straightened out, and in a position just above the ear, near the surface, where it had entered. He opened the skull, making a very small increase in the size of the opening that had already been made by the surgeon at the time of the accident, and at the suggestion of Dr. Alfred Gordon he endeavored to remove the hook by means of a large magnet, such as is used in the eye department of the hospital for the removal of fragments of iron in the eye. Unfortunately, the attempt was utterly unsuccessful. He introduced a pair of forceps and very soon found the hook. It was then evident why the magnet had not been able to extract the hook, which would have been not only a good use of the magnet, but evidently would have done much less harm to the man's brain than would be done by any instrument with which the surgeon would grope, so to speak, around in the brain, not knowing precisely where it was, although the X-ray showed it was within a reasonable distance. The amount of force required to remove the bent hook was considerable, and he presumes it to have been due to the encapsulation which Mr. Ballance referred to, in which sometimes an abscess would roll about like a billiard-ball. The patient recovered both from the operation and the hemiplegia.

Dr. Elsworth Eliot of New York inquired whether, in the case of chronic hydrocephalus treated by ligation of both common carotids, the improvement noticed by Mr. Ballance was permanent or temporary, and if temporary, how long it was noted. He had not understood whether Mr. Ballance said that both common carotids were ligated simultaneously or that there was an interval between the two operations.

Dr. Joseph D. Bryant of New York said that some time ago he had seen a patient with Dr. Rushmore, in which there were distinct symptoms, as evidenced by auscultation, of a murmur associated with some important vessels at the base of the brain. He had not seen Dr. Rushmore since that time, and thought it would be interesting if Dr. Rushmore reported the outcome of that case.

Dr. John D. Rushmore of Brooklyn, New York, replying to Dr. Bryant, said there was trauma, followed by pulsating exophthalmos, and a bruit. He tied the common carotid, with temporary relief, but subsequently the bruit returned subjectively and objectively. He then tied the vertebral high up, where it entered he skull, with a brief period of relief, and then it returned objectively, but the patient never heard it subjectively. To the ear of the listener it was as loud as ever, but the patient was entirely free from the annoying sound. He does not know anything about the subsequent history of the case.

Dr. L. L. McArthur of Chicago said that lest some surgeon should have a case of gauze left in the skull by some previously operating surgeon, he would like to say that he had had a case of aneurysm of the brain, and in making a trephine opening a portion of the trephine entered the aneurysmal cavity. He quickly enlarged the opening, but it still showed such a large cavity that he made compression of the carotid. While the compression was being made he packed some iodoform-gauze into the bleeding pocket, proceeded to ligate the common carotid, and closed the skin-flap over the imbedded gauze. The man recovered and lived for a year or two. At the post-mortem an aneurysm was found, and the gauze, and the surgeon was blamed because the gauze was left there.

Mr. Ballance, in closing the discussion, said, in regard to aneurysmal murmur, he excluded arteriovenous aneurysm. What he had intended to say was this, that he was not acquainted with any one who had heard, with the stethoscope on the head, the murmur of a true aneurysm of one of the vessels, in the circle of Willis, for example. But he had forgotten he was in America.

With regard to the treatment of chronic hydrocephalus, he does not think he was the original person who tied the two common carotid arteries; that is, he was not sure whether he was or not. It had been done by Mr. Stiles of Edinburgh. In his own cases he allowed ten days to elapse between the ligation of the two vessels. He had not had any trouble in ligating both common carotid arteries in cases of hydrocephalus interna in chilren, and this was an excellent method for certain cases, because it arrested the secretion of fluid from the choroid plexus. The other method of subdural drainage was good in some cases, and should be resorted to after the ligation of both carotids had failed.

A paper by Colonel John Van Rensselaer Hoff, Assistant Surgeon-General, United States army, entitled Medico-military Notes in Manchuria, was read by title, in the absence of the author. (See paper, p. 196.)

Dr. John B. Deaver of Philadelphia, Pennsylvania, followed with a paper entitled

A year's experience in intestinal surgery

The 40 patients whose cases form the text of his remarks were operated on at the German Hospital and at the Children's Hospital of the Mary J. Drexel Home since January 1, 1905. These case comprise 12 simple enteroenterostomies; 11 intestinal resections, with enteroenterostomy; 1

enterotomy; 2 colostomies; 7 enterorrhaphies for various forms of fæcal fistula; 1 suture of a typhoid perforation; 1 reduction by manipulation of an intussusception; and 8 instances in which strangulating bands or adhesions were divided, besides 3 other (atypical) operations — a total of 46 operations on 40 patients.

There are 13 cases of intestinal carcinoma, all in the large bowel; the cæcum was dissected in 4 cases, the hepatic flexure of the colon in 2, and there was one case each in which the part affected was the transverse colon, the splenic flexure of the colon, and the rectum; while there were 4 patients in whom the sigmoid was the seat of malignant disease; 5 of these 13 patients died,— those patients in whom the splenic flexure and the rectum were involved; 1 of those with the cæcum affected, and 2 of those in whom the sigmoid flexure was diseased. The remaining 8 patients recovered from the primary operation, and were relieved temporarily, but of the 4 successful cases in which the patients were seen sufficiently early for a radical operation to be done, 2 developed symptoms of recurrence about eight months later, and were again temporarily relieved by further operation; and in the case of 2 others, on whom a radical operation was done, sufficient time has not elapsed since the operation to permit of their being considered in this connection.

SUMMARY OF OPERATIONS ON FORTY PATIENTS

N. B. —Several patients had more than one operation.

Operation	Total	Recovered	Died	Mortality
Colostomy	2	1	1	50.0%
Enterolysis for obstruction by adhesions, etc.	8	8	....	.....
Enterorrhaphy for fæcal fistula	7	7	....	.....
Enterorrhaphy for typhoid perforation	1	1	....	.....
Enterotomy for obstruction	1	1	....	.....
Ileocolostomy	6	5	1	16.6%
Ileosigmoidostomy	6	3	3	50.0%
Intussusception reduced	1	1	....	.....
Laparotomy for dynamic intestinal obstruction	1	1	..	.....
Laparotomy to release kink causing obstruction	1	1	....	.....
Resection of small intestine, with end-to-end anastomosis	5	3	2	40.0%
Resection of cæcum, including portions of ileum and ascending colon	3	2	1	33.3%
Resection of hepatic flexure of colon, including portion of ascending and transverse colon, with end-to-end anastomosis of colon in one case, and a lateral anastomosis of ileum to transverse colon in other	2	2	..	.....
Resection of sigmoid flexure, and ileosigmoidostomy	1	1	....	.....
Sigmoidoproctostomy	1	....	1	100.0%
Total	46	37	9	17.3%

DISCUSSION

Dr. A. J. Ochsner said Dr. Bradford's paper will have a very good effect, because it shows the anatomical conditions before and after both forms of treatment. He had observed the manipulative treatment in some thirty selected cases, and in this series there were but two joints in which it was possible to demonstrate the results by the anatomical specimens afterwards. Both of these joints were in the same child, who died from some acute cause three years after a cure of the dislocation was effected, and in this case a practically normal joint was established. There could be no doubt from the skiagrams of the cases referred to, and from those cases which were operated on by his brother (Dr. Edward H. Ochsner), that in thoroughly selected cases the results by manipulation are as good, both anatomically and practically, as those by the other method. These children walked without limp. The skiagrams show that they have good joints. For the other class of cases, he believes Dr. Bradford's plan should be followed.

Dr. M. L. Harris of Chicago said that during Mr. Bartlett's visit to Chicago with his apparatus, he had a case of double congenital dislocation in the Children's Hospital, which he had tried to reduce by manipulation and had failed. Mr. Bartlett made vigorous attempts to reduce the dislocations with his instrument, but failed. After the child had recovered from the quite severe manipulative attempts, the speaker cut down on the joint and found the constriction of the capsule mentioned by the essayist, and only after dividing it with bistoury was he able to get the head back into the joint. It offered a complete obstacle to reduction in the case, and could not have been reduced by any amount of force or manipulation. It is necessary to divide the capsule throughout its entire length in these cases, in order to remove the constriction, so that the head of the bone may enter the cavity.

Dr. Bradford, in closing, said he was very glad the facts which he had tried to present met with acceptance. He thought when surgeons decided to cut down on these cases they would find that the method he had suggested was the simplest one. He had had one death in the last few years from sepsis. He has also had one death from aciduria following manipulative reduction. He does not think the operation of incision is much more dangerous than that of severe reduction, but incision should be reserved for the severer cases.

Dr. Edward Martin of Philadelphia read a paper on Open Treatment of Fractures. (See paper, p. 258.)

DISCUSSION

Dr. W. W. Keen said that he has had only one case of ununited fracture of the neck of the femur in a comparatively young person, the result of traumatism, in which he used a screw. He understood Dr. Martin to say that he urged the use of a screw six inches in length, driven not only through the two fragments of the femur, but into the pelvis. He objected to this, on account of the fact that it would undoubtedly be followed by a rigid joint at the hip, or ankylosis of the hip-joint. In his own case, and in at least one or two others that have been reported, this was unnecessary. In his own case he was careful, after measuring the parts on an X-ray picture, to select an ordinary screw three inches long, which, when countersunk, reached from the great trochanter nearly through the head of the bone, but not into and invading the joint, and especially was he careful not to invade the pelvis. The result was satisfactory. The patient was able to walk about without either a crutch or a cane. The operation consisted in making two incisions, one in front down to the capsule, opening the capsule, chiseling the two ends of the bone, so as to make a fresh raw surface, because the fracture was an old one, and then a second incision over the great trochanter through which the screws were inserted.

Dr. Leonard Freeman of Denver, Colorado, said the essayist did not mention the use of external clamps, which were recommended to the association by Dr. Parkhill years ago, and he wished to speak of them in connection with recent fractures. Dr. Parkhill demonstrated the great efficiency of external clamps, to the satisfaction of all. He has had occasion to use a clamp which he has devised, upon the same principle as that of the Parkhill clamp, but which is a little different in its construction and much more simple. He has had occasion to use this clamp frequently in the treatment of certain recent fractures. He agreed heartily with Dr. Martin that the best method of treating recent fractures is not by the open method, for frequently one comes across an oblique fracture which it is almost impossible to hold by splints, and rather than let such a fracture go, it is better to cut down upon it. Sometimes the fragments can be held with wire or by suture. If they can be so held, this is, without doubt, the best procedure; but at the same time there are cases which cannot be held with wire, and in which, in order to insert the wire, we have to strip up the periosteum and use a great deal of mutilating manipulation. In some of these cases the use of the external clamp is of very great service. This may be objected to on the ground that infection is liable to take place after its use. He does not think this objection will hold. His experience is, that when the screw is used, infection does not take place very rapidly through the openings in which the screws are inserted, and although infection may occur at the end of two or three weeks, it does not do material damage, and disappears when the screws are removed.

Dr. Freeman described his clamp, and presented it on account of its effectiveness and simplicity.

Dr. Joseph C. Bloodgood of Baltimore, Maryland, called attention to the recent work on fractures of the neck of the femur by Franz König, son of Professor König, who is of the opinion that the lack of union of this fracture is not due to improper apposition of the bony fragments, between the head and neck, but to the fault in the circulation from a tear in the capsule. He called attention to the recent work of Royal Whitman of New York, relative to the position of abduction in fracture of the neck of the femur, in which it is demonstrated that the old methods of extension should be given up, and that surgeons should try forcible abduction, fixing the limb in a properly applied plaster cast.

In the open treatment of fractures, surgeons do not cut down upon the fracture simply to wire the fragments, but for the purpose of reducing the fragments, and this was one of the objections to any method of external application of the screws. The great object of operation in fracture is not so much fixation of the fragments as their proper reduction.

Dr. Martin, in closing, said that Dr. Keen had misunderstood him, in saying that he advocated the use of a six-inch screw driven into the pelvis. In all of the cases in which short screws were inserted into the head and neck of the femur for the correction of fractures, union resulted.

He pointed out the advantages of the electric drill for facilitating operation in these cases, and said that one should have the proper tools to work with; then better mechanical results were likely.

Dr. F. J. Shepherd of Montreal read a paper entitled Experience in the Operation of Thyroidectomy. (See paper, p. 272.)

DISCUSSION

Dr. Willis G. Macdonald of Albany, New York, spoke of the character and kind of anæsthesia to be employed in such cases. In the immediate neighborhood of Albany, in the past three years, three patients have died on the table from the effects of general anæsthesia during attempts to remove thyroids. The only patient he ever lost in attempting to do a thyroidectomy was from ether anæsthesia. For the last five years, practically only a very small percentage of his patients have received any general anæsthetic. A considerable

proportion of cases upon which he has operated have been instances of exophthalmic goiter, in which he has removed practically two thirds of the gland. In scarcely ten per cent of the cases has he been obliged to give a general anæsthetic, and then it has been chloroform and oxygen.

The plan employed has been, usually, to discuss frankly and freely with patients the dangers of general anæsthesia in thyroidectomy, to secure their consent and co-operation. Half an hour before the operation is undertaken, the patient is given a quarter-grain of morphine and a one-fiftieth grain of atropia. When the patient is placed upon the table, a compound solution of one half of one per cent of cocaine, with one to fifteen or twenty thousandths of adrenalin chloride, has been used. Whenever he uses the ordinary incision of Köcher, about thirty minims is used, which allows one to expose the gland. After having exposed the gland, one can use a solution of half that strength, that is, one quarter per cent. Besides the relief from all anxiety incidental to the use of general anæsthesia, it has another advantage, namely, that when one operates under local anæsthesia he will not injure the recurrent laryngeal nerve. He thinks it is difficult, under general anæsthesia, to avoid injuring the recurrent laryngeal nerve, particularly on the right side, when an effort is made to ligate the inferior thyroid artery.

Dr. Roswell Park of Buffalo, New York, referred to the use of the pneumatic suit devised by Crile, and the semivertical position of the patient, by which the veins of the neck are kept well drained, and by which, at the same time, blood-pressure is maintained to any desired degree. Ever since he has learned this method, he has resorted to it constantly, and said he would not undertake a goiter operation now without the use of the pneumatic suit and that position.

Dr. Charles H. Mayo of Rochester, Minnesota, said he had operated on 232 cases of goiter, of which 85 were exophthalmic. He has had one death out of the entire number, from pneumonia, occurring on the eighth day after operation, excluding the exophthalmic cases, carcinoma, and sarcoma.

In the 232 cases he used cocaine anæsthesia 13 times, and in 3 completed the operation under chloroform. In the last 150 cases he had used ether. He said one could avoid all of the bronchial irritation by giving the patient hypodermically one one-twentieth of a grain of atropine, with morphine, twenty minutes before operation.

Dr. Joseph C. Bloodgood said that the difficulty in recognizing the parathyroids at the operation or from the specimen is due to the fact that little pieces of muscle looked like parathyroids. This statement is based upon a number of observations made in the last two years.

One of his colleagues has examined carefully every case of thyroid tumors, goiter, exophthalmic, or what not, for parathyroids, at the time of operation, and in the laboratory, and little pieces they thought were parathyroids have been examined microscopically, and in some parathyroids have been found, while in others they found aberrant thyroid tissue. It is difficult to be certain, except with the microscope, what we are dealing with, and, practically, he thinks it is a good plan, when enucleating more than half of the lobe, to brush with gauze everything that looks like parathyroids back into the neck.

Dr. Arthur Dean Bevan of Chicago has been much impressed with the great benefit derived from operations on exophthalmic goiter cases. He has operated on sixteen cases of exophthalmic goiter, with one death. The relationship between the removal of the goiter tissue and the clearing up of the symptoms has been so definite that he believes we should urge operations for exophthalmic goiter cases very much more strongly than we have in the past, unless the future shows that serum-therapy will make the operation unnecessary. He has had, for instance, a woman who had lost 60 pounds in weight in 60 days; from 160 pounds she declined in weight to 98½ pounds, with exophthalmic goiter. He removed the larger part of the gland and ligated the vessels upon the other side, the operation being followed immediately by rapid improvement. Within two months, 40 pounds of her lost weight was regained, and in his 16 cases, exclusive of the death mentioned, improvement has been so constant, with the exception of 2 cases, that he has no doubt but that we have in the thyroid a cause of the condition, and that we can cure this condition better at present by operating on these thyroids than by any other method.

Dr. Shepherd, in closing, said that he has examined a number of these cases with a view to finding parathyroids, as has also a pathologist, and they are not easy to find. When they have been found in exophthalmic goiter, they have not been degenerated, but perfectly normal.

The Radical Cure of Femoral Hernia, with a Report of One Hundred and Fifteen Cases

Dr. William B. Coley reported 115 operations for femoral hernia in 104 patients, 32 of whom were children between 2 and 14 years of age, and 72 adults. Of the children, 9 were males and 18 females; 3 were under 5 years of age, 15 from 5 to 10 years, and 14 from 10 to 14 years. There were

83 operations performed upon 72 adults between 14 and 70 years.

The relative frequency of operation for femoral and inguinal hernia was 1 to 14, Dr. Coley's 115 cases occurring in a total series of 1,678 operations for hernia.

Two methods of operation were employed by Dr. Coley; i. e., with the Bassini method, the substitution of kangaroo tendon for silk, in 15 of the earlier cases; the purse-string suture method of completely closing the external opening of the femoral canal after high ligation of the sac was used in 100 cases. The technique of the operation is, briefly, as follows: Thorough freeing of the sac well beyond the neck; high ligation of sac and closure of the canal by means of a purse-string suture of chromicized kangaroo tendon. The suture is introduced through Poupart's ligament or the inner portion of the roof of the canal, from where it passes downward into the pectineal muscle or floor of the canal, then outward through the fascia lata overlying the femoral vein and upward through Poupart's ligament, or roof of the canal, emerging about a quarter of an inch from the point of introduction. On tying the suture, the floor of the canal is brought into apposition with the roof, and the femoral opening is completely obliterated. The skin and superficial fascia are closed by means of an interrupted catgut suture, and a sterile dressing is applied, without drainage.

The author has employed this method in 100 cases without a single relapse, his results in the total series of 115 cases showing 55 cases traced to have remained well from 1 to 12 years. In the non-strangulated cases there has been no mortality, and only one case of suppuration. In the strangulated cases, four in number, there was one death.

Dr. Coley discusses at some length the more recent and complicated operations, in which an attempt is made, in various ways, to close the femoral canal from the inner side, and endeavors to answer the objections raised by the originators of these methods to the simpler operation of Bassini and the purse-string method. He points out that such objections are nearly all purely theoretical, and expresses the opinion that the value of any method for the radical cure of hernia should be determined by the practical results. He states that the ideal operation should fulfill, as far as possible, two conditions; namely: 1. Simplicity of technique; 2. Efficiency; i. e., permanence of cure.

If the closure of the external opening of the femoral canal by a simple method has resulted in perfect and lasting cure, he avers it should have the preference over the more difficult and complicated methods, involving an attempt to close the inner portion of the canal, no matter how great the theoretical advantages of the latter.

As regards the claim of Heidenthaler, referred to by Kammerer, that femoral hernia in which the external ring has been sutured recurs very late, on an average after two years, Dr. Coley points out that at the time of the publication of Heidenthaler's article in 1890, only a few scattered cases had been reported, in which, in addition to ligating the sac, an attempt had been made to close the femoral canal, and that hence no weight could be attached to conclusions drawn on basis of such few and imperfectly traced cases. He adds an abstract of the statistics at the Hospital for Ruptured and Crippled, showing twenty-eight relapses following operation done for femoral hernia within the last sixteen years, of which seventeen occurred within the first year, and only three later than two years after operation.

Dr. Roswell Park of Buffalo, New York, read a paper entitled A New Method of Utilizing the Sac in the Radical Treatment of Inguinal Hernia. (See paper, p. 328.)

Dr. Joseph D. Bryant of New York City read a paper entitled Aspiration of the Thorax in Alleviation and Cure of Empyæmic Cavity. (See paper, p. 296.)

Dr. Elsworth Eliot of New York City read a paper on Acute Intussusception in Infants and Young Children. (See paper, p. 225.)

Dr. William J. Taylor of Philadelphia read a paper entitled The Use of Thyroid Extract to Shorten the Coagulation-time of the Blood. (See paper, p. 219.)

Dr. Frank J. Lutz of St. Louis, Missouri, contributed a paper on Excision of the Scapula for Malignant New Growths, which will appear in a later issue of Surgery, Gynecology and Obstetrics.

Dr. Charles B. Nancrède of Ann Arbor, Michigan, read a paper on Hyperplastic Tuberculosis of the Intestines and Peritoneum. (See paper, p. 302.)

Dr. William J. Mayo of Rochester, Minnesota, read a paper entitled

A REVIEW OF FIFTEEN HUNDRED OPERATIONS UPON THE GALL-BLADDER AND BILE-PASSAGES, WITH ESPECIAL REFERENCE TO THE MORTALITY

He said that the mortality in 1,500 operations was 4.4 per cent. In the last series of 500, it was 3.2 per cent. Every operated case dying in the hospital, without regard to the time or cause of death, was counted as an operative mortality.

Of operations for uncomplicated gall-stone disease, the mortality, one third of one per cent, was

due to accidental causes. Complications, the result of delay, caused more than nine tenths of the death-rate; ninety-five per cent of all complications occurred in patients who have had marked evidences of gall-stone disease, and ample period of good health for safe operation.

The now recognized necessity for early operation in appendicitis is due to the former high mortality attending secondary abdominal complications. The same reasons hold good for early operation in gall-stone disease, only it is the involvement of the liver-ducts instead of the peritoneum which gives rise to fatal complications.

Of 845 cholecystostomies, the mortality was 2.13 per cent. In the last series of 500, it was 1.47 per cent. Of 319 cholecystectomies, the mortality was 3.13 per cent. In the last series of 500, it was 1.62 per cent.

The operation is indicated in all cases in which the gall-bladder has lost its function, especially in cystic duct obstructions, and for malignant disease. It is a slightly more serious operation than cholecystostomy, but has a growing field of usefulness in all cases in which the gall-bladder is involved.

There were 207 common-duct operations.

Group 1. 105 cases, 3 deaths (2.9 per cent), consisting of those cases having gall-stones in the common duct, operated during the quiescent period; jaundice and infection moderate.

Group 2. 61 cases, 10 deaths (16 per cent), in which there was active infection involving the ducts of the liver, and jaundice. Patients suffered from Charcot's fever (fever and ague type). Obstruction was severe, but not continuously complete.

Group 3. 29 cases, 10 deaths (34 per cent). Complete obstruction of the common duct, in which no bile passes into the intestinal canal, elimination taking place by means of the kidneys and skin.

Group 4. Malignant disease. 12 cases, 4 deaths ($33\frac{1}{3}$ per cent). Gall-stones present in nearly all.

The pancreas was involved in 86 out of the 1,500 cases; 4 acute, with 2 deaths; 6 subacute, with 1 death; 9 cancer, with 5 deaths; 67 chronic, without marked effect on the mortality.

Dr. C. A. Porter of Boston read a paper entitled The Serum-therapy of Tetanus. (See paper, p. 325.)

Dr. Joseph A. Blake of New York read a paper entitled The Treatment of Tetanus by Magnesium Sulphate. (See May number of Surgery, Gynecology and Obstetrics, p. 541.)

The present status of our knowledge of the serotherapy of surgical affections

Dr. Charles A. Powers of Denver, Colorado, read a paper on this subject.

The writer stated that while there are a vast number of contributions to this subject, but very few of them bear the test of rigorous analysis. The majority consist of scattered cases of recovery from sepsis, a serum having been employed. Scientific details are lacking. He said that in his analysis he would be guided by the following principles:

1. Isolated reports of one or a few cases would be omitted. Most reports of this character emanate from physicians who, being perhaps unfamiliar with surgical diagnosis and operative management, choose the use of a serum when medical measures fail and do not give their patients the benefit of ordinary surgical procedures.

2. As far as possible, dependence would be made on the testimony of surgeons, embodied in systematic writings on infections, where, under the head of treatment, serotherapy is compared with other measures, and a verdict thereby rendered.

3. Scientific requirements should be fulfilled as far as possible. It should be shown in individual cases that a correct diagnosis has been made, and that the infection is a pure one. Further, the mere fact that a patient recovers is not sufficient for a demonstration. Further, given the special symptoms produced by a certain germ, it should be shown that the serum, shortly after its administration, favorably modified these symptoms, so far as the latter could have been due directly to the specific toxæmia or bacteriotoxæmia of the disease.

But few articles reach this standard, and analysis of these shows that at present serotherapy is valueless in sepsis other than that due to tetanus. Antistreptococcic serum has failed to gain a place in surgery. This sustains Vaughn's contention of two years ago. The serotherapy of tetanus has a place, but its exact value is as yet unknown. It seems probable that while it fails to cure severe and advanced cases, it has effect in early and mild cases. As a prophylactic measure, it seems to have achieved a standing, yet many fatal cases develop, despite its early use. Further, it is never possible, without bacteriological proof, to say that tetanus would have developed in the cases in which it is used as a prophylactic. The subject is at best a hazy one, and the writer urged detailed reports of authentic and carefully analyzed cases.

Dr. Willis G. Macdonald of Albany, New York, read a paper on Bacteriological Studies in the Surgical Clinic. (See paper, p. 216.)

Traumatic gastric and duodenal ulcer due to a direct blow revealed by operation

Dr. A. F. Jonas of Omaha, Nebraska, said the progress of cases of extensive contusions that occur after severe blows to the stomach and intestines

was rapid; death occurs early, unless prompt surgical aid is brought to bear. It is difficult to judge correctly in cases where the injury has produced a contusion or laceration of a part of the gastric parieties, as, for instance, mucosa, or where a hæmatoma has developed between the coats of the gastric wall, i. e., between the mucosa and muscularis.

Illustrative cases were cited showing the value of prompt surgical intervention.

Dr. A. J. Ochsner of Chicago reported his further investigations upon the anatomy of the duodenum, and detailed his clinical observations.

THE TREATMENT OF GASTRIC AND DUODENAL ULCERS AND BENIGN OBSTRUCTIONS OF THE PYLORUS

Dr. Archibald MacLaren of St. Paul, Minnesota, said the question how we may distinguish between medical and surgical gastric ulcer is of the greatest importance to-day. It is known that some ulcers cure themselves, and that many give no symptoms. Shattuck says: "There are only two conditions occurring in gastric ulcer which demand operation: 1. Perforation; 2. Obstruction."

He agreed with Shattuck in the necessity of operating in these two classes. In perforation due to an acute ulcer, if the opening can be closed, the wound sponged or irrigated, a large-sized suprapubic drain put in soon after operation, a large percentage will recover, with the aid of Fowler's position. In obstruction cases, the condition is mechanical and demands mechanical relief.

One other class should be added to this list; i. e., relapsing gastric ulcer. The ordinary medical treatment is useless in these cases. Proper medical treatment lies in putting the patient to bed, taking away all food by mouth for some days, and supplying water and nourishment per rectum. He reported two cases, lately seen, of congenital obstruction; one dying after gastroenterostomy, the other without operation.

Gastroenterostomy is the most popular; posterior no-loop operation, last described by Mayo, is the best operation. The anterior long-loop operation was followed by a relapse, due to dragging of loop on the anterior suture-line, producing contraction of the opening. Now that the anterior operation has given place to the posterior no-loop operation, we do not hear so frequently of the necessity of closing the pylorus. The Roux operation is not necessary, and is more dangerous, because of the two intestinal openings and two lines of suture.

EARLY OPERATIONS FOR CEREBRAL HEMORRHAGES OF CHILDHOOD

Dr. Charles H. Frazier of Philadelphia said that in order to put on a rational basis the surgical treatment of epilepsy, greater discrimination must be made in the selection of cases. No opportunity should be lost, in operations upon epileptic subjects, to observe as closely as possible the existing pathological conditions. A more intimate knowledge of the pathology of the disease is necessary for the establishment of a basis upon which to determine the propriety of operative intervention and the character of the same. Epilepsy develops sooner or later in from thirty to fifty per cent of cases of infantile hemiplegia. In many of these the lesion has been proven by autopsies to have been a hemorrhage, and in children the hemorrhage is often either on or near the cortex, rather than intracerebral, as in adults. The tendency towards secondary degenerative changes, such as atrophy and softening, the greater disposition in epileptic subjects towards mental defects, especially idiocy, and the otherwise hopeless nature of the disease, constitute the principal arguments for surgical intervention.

Dr. Joseph Ransohoff of Cincinnati, Ohio, contributed a paper entitled Exophthalmos Pulsans, with Report of a Case. (See paper, p. 193.)

Mr. Hamilton A. Ballance of Norwich, England, contributed a paper, by invitation, in which he reported a very interesting case of traumatic hemorrhage into the left lateral lobe of the cerebellum, which he treated by operation, followed by recovery.

The following papers were also read:

Histological Basis and Limitations of Surgery of the Spinal Cord, Based on Experiments, Clinical Experience, and Histological Research, by Dr. J. B. Murphy of Chicago; Tetanus and its Serum-therapy, by Dr. Nathan Jacobson of Syracuse, New York, and Dr. Henry D. Pease of Albany, New York.

OFFICERS

The following officers were elected: President, Dr. Dudley P. Allen, Cleveland, Ohio; Vice-Presidents, Dr. Thomas W. Huntington, San Francisco, California, and Dr. A. F. Jonas, Omaha, Nebraska; Secretary, Dr. Robert G. Le Conte, Philadelphia, Pennsylvania; Treasurer, Dr. Charles A. Powers, Denver, Colorado.

NEXT ANNUAL MEETING

Washington, D. C., was selected as the place for holding the next annual meeting, in conjunction with the American Congress of Physicians and Surgeons, 1907.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

JOHN B. MURPHY, M. D. — E. WYLLYS ANDREWS, M. D.
FREDERIC A. BESLEY, M. D. — WM. R. CUBBINS, M. D.

THE ÆTIOLOGICAL RELATIONSHIP BETWEEN ACUTE SINGLE TRAUMAS AND SARCOMA. By Dr. S. Löwenstein. From the Heidelberg Surgical Clinic, Gehemirat, Prof. Dr. Czerny, Director.

The author quotes a case observed by him while studying in the Heidelberg Clinic, of a man of 41 years who fell from a bicycle upon the left ischial region. A tumor developed in the injured region, and led to death about six months after the injury. Autopsy showed a sarcoma of periosteal origin with numerous metastases. The writer quotes, also, 19 other cases from the records of the Heidelberg Clinic, and has collected 111 cases of sarcoma from the literature, in which a history of trauma at the affected region appears.

Opinions of many authors are quoted and discussed. Summing these up, the writer makes the following statements:

1. The possibility of a malignant tumor, especially a sarcoma, resulting from a trauma may be affirmed.

2. The exact role which the trauma plays in the actual production of the tumor is not yet explained.

3. The conditions under which a tumor which, by the patient, is stated to have been caused by a trauma may also be considered by the physician as necessarily having been caused by the trauma are not yet thoroughly outlined.

In the Heidelberg Clinic, four per cent of sarcomas have followed a single trauma. The trauma in the observed and quoted cases is usually rather severe, although in many it is of a light character.

The tumor development began usually from a few weeks to a few months after the injury. The element of time is stated, however, to be variable, and may even amount to years.

As to the character of the tumors, those of rapid growth were usually round-celled. Spindle-celled sarcoma almost never found pure, round and spindle cells being combined.

The point of origin was, in a great majority of cases, the bone, and the sarcomata were therefore of periosteal or myelogenic origin.

As to sex, Löwenstein finds, in his cases, 89 men and 42 women. If children up to 14 years be subtracted, he has 79 men and 38 women.

Löwenstein believes that an individual predisposition exists where malignant disease develops after a trauma, and that the predisposition may depend upon endogenous physiological conditions, or upon exogenous conditions of the individual, or even upon local conditions confined to one organ. As endogenous conditions which may favor development are, in women, the developmental stage of puberty, pregnancy, and the climacterium; in both sexes, the beginning of old age. In children, the growing bone has a more or less marked tendency toward progressive processes.

Among the causes of external origin may be mentioned lowering of the individual resistance by hard work or poor nutrition.

As to how long after a trauma a sarcoma may be attributed to the trauma as its cause, the author states that no definite answer can be given, but that in each case the whole history as well as the microscopic character of the tumor must be taken into consideration. W. C. DANFORTH, M. D.

POST-OPERATIVE ILEUS. By John M. T. Finney, M. D.

This paper discusses this subject at length, and the essayist reports in detail twenty-six cases that have occurred in his private and hospital practice. He treats of post-operative ileus alone.

Baisch gives Sir Spencer Wells credit for the first description of this condition, in a paper published in 1860. Schroeder, in 1878, was the first to operate for this condition. Olshausen reports a successful case in 1879. In 1894, Tuja reported 43 cases, 5 of which were surgical. Werth recommended enterostomy for the relief of intestinal obstruction in 1899.

The author accepts the classification of Mikulicz, mechanical and dynamic, as the most satisfactory.

The two great factors concerned in the ætiology of post-operative ileus are of either mechanical or septic origin. A third and smaller class, due to disturbance of innervation and circulation, is men-

tioned. Mention is made of the experimental work of Dr. Charles E. Simon, to determine the opsonic content of the blood, in an effort to distinguish between mechanical and septic ileus. The work is incomplete at present, but seems to show that with a low dilution of 1.10, there is little deviation from what we may regard as normal in the dog.

The writer regards the increase of indican in the urine as of little diagnostic value.

Vomiting in these cases is an early as well as a diagnostic sign, and usually becomes pronounced. Reversed peristalsis is usually assigned as the cause of this phenomenon, but experimental researches of several investigators seem to show that abdominal muscles are largely concerned in its production. It is stated that Krehl accounts for the distention of the intestine by gas in two ways: 1. The swallowed air; 2. The gas produced by fermentation. The profound prostration is accounted for by the assumption that poisonous substances, chiefly neurin, lecithin, and cholin, are produced in the intestines and absorbed.

Dr. F. T. Murphy of Boston is quoted as believing that a vasomotor paralysis plays an important part in the production of collapse. The writer's experience leads him to believe that the production of adhesions and their subsequent disappearance are matters over which the surgeon has little control. The limiting of the amount of packing and the use of materials which least excite adhesive peritonitis are to be recommended.

From a study of his own cases, the author believes that a majority of cases occur early. Of his cases, 14 occurred early and 12 late. Of the early cases, 10 occurred within the first week, and all within three weeks. Of the late cases, 5 occurred within six months, and 3 were over five years. In the series of 26 cases, 22 were operated upon a second time for obstruction, and $61\frac{5}{10}$ per cent of the cases followed appendicitis, acute or chronic.

The causes of obstruction were: Kinking, 7; adhesions alone, 7; bands, 3; volvulus, 2; loop caught beneath adherent loop, 1; cicatricial stenosis, 1; gastromesenteric ileus, 1; adynamic ileus, 1; cause unknown, 3.

In 78 per cent the obstruction occurred, either directly or indirectly, as the result of peritoneal adhesions. The seat of the obstruction was as follows: In the small intestine, 20; within the lower 12 inches of the ileum, 10; exact position not stated, 10; pylorus or duodenum, 3; sigmoid, 2; ascending colon, 1. In the series, 16 cases had been drained; 10, or 38.4 per cent, were not drained. Enterostomy was performed 9 times. There was but one case of adynamic ileus.

A short but concise history was given of each of the 26 cases, and these conclusions deduced:

1. Broca's classification into early and late varieties simplifies the diagnosis. In the former class, which so frequently is associated with peritonitis, the differential diagnosis as to variety was always difficult and often impossible. In the latter, which is composed almost exclusively of the mechanical form, it is usually easy.

2. Adhesions are the chief factor to be reckoned with in an attempt to prevent the occurrence of post-operative ileus, and efforts directed toward this end are likely to be productive of the best results.

3. That drainage exercises a marked influence in the production of adhesions cannot be denied.

4. *Treatment.* Prompt operation is indicated in every case after palliative measures have been given a fair trial and have failed. The character of the operation depends upon the nature of the obstruction.

5. Prognosis is unfavorably influenced by the presence of infection. In its absence, it is excellent.—*Annals of Surgery*, June, 1906.

F. A. Besley, M. D.

A Case of Volvulus of the Stomach. By George Street, M. D.

The author describes a case of his own of volvulus of stomach, and cites several cases from the literature.

The first symptom noted was vomiting, about two hours after eating. He complained of tenderness and pain in epigastrium; pulse was small and weak; abdomen became rigid and very tender; upper half of abdomen gave a tympanitic note; temperature 97.6°, pulse 95; complete obstipation and continued vomiting.

The next morning he appeared very weak, and died about 9 P. M. Autopsy revealed a large, inflated tumor which proved to be the stomach distended with gas. Its greater curvature measured 64 cm. It was turned completely upside down and from left to right, and producing a torsion of lesser omentum and drawing the spleen and transverse colon to the right and upward so that they lay on the upper side of the stomach in the position of the right lobe of the liver and directly beneath the ensiform. The pylorus was simply flexed upon itself and compressed, not twisted. The spleen was torn from its external peritoneal attachment, and as a result there had been a hemorrhage into the abdominal cavity of from 300 to 400 c.c.—*American Journal of Medical Sciences*, June, 1906.

F. A. Besley, M. D.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF GYNECOLOGY

UNDER THE CHARGE OF

J. CLARENCE WEBSTER, M. D. — E. C. DUDLEY, M. D.
JOHN C. HOLLISTER, M. D. — F. W. LYNCH, M. D.

TUBERCULOSIS OF THE CERVIX. By Auguste Pallosson and H. Violet.

This article is based upon the 47 cases collected by Sannes-Dehore (*Thèse*, Lyon, 1904), upon 2 more observed by the authors, and upon 8 further cases found in the literature, bringing the number to date up to 57.

First the authors' two cases are described in full — both as to clinical history and as to gross and microscopical pathological findings. Then the whole subject is taken up and discussed under the following heads:

1. *History.* Under this heading the literature from Raynaud's publication of two cases in 1831 down to Téduat and Martin's articles in 1905. Some thirty-three references are given.

2. *Ætiology.*

(*a*) Frequency. "Tuberculosis of the uterine neck is a rare lesion. Cornil found no case among all that died of phthisis at the Amphithéâtre for two years. Spaeth found 6 cases out of 119 cases of *genital tuberculosis* (5 per cent); Mosler, 4 out of 46 cases (11 per cent)."

(*b*) Age. Nothing definite. The youngest reported is of 20 years; the oldest, 79. "One can say the disease is most frequent in the period of sexual activity."

(*c*) Influence of accouchement. This is not determinable from the cases reported.

3. *Pathological Anatomy.*

(*a*) Gross. The location is variable. In the large majority of cases, both vaginal and cervical portions are involved. The attending ectropion of the mucous membrane makes it very difficult to differentiate exactly the portions. Of the relationship of this location to lesions of other parts of the genital tract they say that in 6 cases the uterine body and adnexa were free; in 3 cases the uterus was invaded and tubes were free; in 1 case the uterus was intact and tubes were involved; in 1 case there was an associated peritoneal ulceration; in 3 cases, multitudinous vaginal ulcerations; in 5 cases, the neck lesions appeared to have been due to a descending invasion. In the other cases the uterine body lesions are discrete, discoverable only by microscope. The associated tubular lesions are more or less advanced.

As to the *Forms*, the authors agree with Pozzi, and describe:

1. Miliary tuberculosis of the neck.
2. Ulcerative form.
3. Papillary form.

(The so-called "catarrhal form" the authors consider a single inflammation.)

1. Miliary form. Rare. Found usually at autopsy, and, as a rule, associated with advanced tuberculosis.

2. Ulcerating form. The most frequent. "It appears in the form of a single ulceration, spread out, developing at the level of one of the lips with a polycyclical outline with a white or yellow base and sharp cut borders. Ths is associated more or less with the following:

3. Papillary form. When on the neck it appears as neoplastic vegetations. These are real fleshy buds with irregular surface and mulberry appearance, rather than like mucous polyps. On account of its aspect, this variety recalls certain forms of mucosa papillary tuberculosis. Consistency is soft and elastic, as a rule, like the neck on which it rests, without the characteristic hardness of the epithelioma. The vegetations are of reddish color, covered with a non-adherent gelatinous deposit.

(*b*) Microscopic. "The tubercular lesions lie in the connective tissue of the neck, in the submucous chorion, in the intermuscular spaces and interglandular spaces along the vessels. They are isolated or confluent tubercular follicles in different stages of development. At the same time there is present a severe inflammation. The lesions can penetrate deeply in the intermuscular tissues and can break down the muscle fibers themselves." The condition of the usual glandular and mucosa findings is described in detail.

"The microscopical diagnosis is sometimes very difficult. It is complicated by the fact that

there is reported a certain number of cases of the co-existence of cancer and tuberculosis, and also of associated cancer in the uterine body or tubes." The authors' opinion as to the co-existence in the same area of tuberculosis and cancer is not definitely given, but Tripier is quoted as being doubtful.

Symptoms:

1. Physical. Onset usually insidious.

Functional signs:

(*a*) The *general condition* of the patient is not usually poor, but, on the other hand, good nourishment is found.

(*b*) Menstrual disturbances. Usually present, metorrhagia, etc.

(*c*) Purulent leucorrhœa. Very common.

(*d*) Pain not usually marked.

(*e*) Afebrile.

Objective signs. Four clinical forms:

1. Granulation.
2. Ulcerating.
3. Vegetating.
4. Intracervical polypoid.

(Each of these is quite carefully described.)

Diagnosis:

1. From a common metritis with ectropion or single erosion. Often here necessary to have microscopical examination.

2. From chancre — syphilitic. Very rarely on the neck. Treatment, etc. Other symptoms.

3. From carcinoma. The authors have collected eleven cases where the uterus had been removed for cancer, but were found tubercular upon further examination.

In spite of the opinions of other writers, the authors say it is only the microscope that can affirm the nature of the lesion.

Tubercular foci elsewhere; youth; mucous glairy and frankly purulent discharge; less intense pain; oscillating temperature; the rose-colored vegetations covered with mucus and having a rose and yellow base; soft elastic feel to the depressions and nodosities, — all these speak for tuberculosis. " But all these differential characterisics are not sufficiently marked to be able to assure more than a *probable* diagnosis."

Histological examination and finding of Koch's bacilli only can establish the sure diagnosis. The former is most practical, for inoculation experiments take too long.

Prognosis. Same as tuberculosis in general; that is, the progress depends upon the form of infection and the " soil " in which it is localized. Deaths from later ulcerations and hemorrhages are mentioned, and then the following is quoted: " Actuellement, lisons-nous dans l'observation, la guérison n'est pas encore venne et 1 pronostic est réservé."

Treatment. The treatment of tuberculosis of the neck is difficult to establish, on account of the small number of cases and such varying clinical manifestations. This treatment is subordinate to the general health of the patient, to the presence of other tubercular foci more important from a vital standpoint.

The extent of the lesion in the genital tract — whether the body and adnexa have associated lesions, and whether the lesions are progressing or are retrogressing — must be ascertained.

" From our two cases, and guided by our ideas of general pathology, we would say that it is best to be essentially conservative in the question of uterine tuberculosis." Cures by strictly local applications, cauterizations, etc., are quoted, but the authors doubt the " restitutio ad integrum " in such cases.

When the lesion is more extended, one can choose between amputation by the knife or by cautery. The hot iron is preferred by the authors, on account of the hemorrhage. As to radical intervention, they say, after reciting in detail the results of the different cases operated: " The radical treatment should not be employed except where conservative treatment has failed or would be contraindicated by the concomitant existence of tubercular lesions of the adnexa and pelvic peritoneum." Abdominal intervention—total castration — should be reserved for those cases in which the adnexal or peritoneal lesions are sufficiently marked. If the lesions are " faint," one fears the trauma attending a hysterectomy, or amputation of the neck to " rouse them up." If the lesions are progressing, total castration by the abdominal route, after cauterization of the neck, or by the combined routes, is recommended.

Records of each of the 57 cases collected are appended.— *La Tuberculose du Col de l'Utérus, Revue de Gynéc. et de Chir. Abd.*, No. 2, Mars-Avril, 1906. JOHN C. HOLLISTER, M. D.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. BACON, M. D. RUDOLPH W. HOLMES, M. D.
C. v. BACHELLÉ, M. D.

A SYMPOSIUM UPON EXTRAUTERINE PREGNANCY[1]

PREPARED BY C. E. PADDOCK, M.D.

THE DIAGNOSIS OF EARLY EXTRAUTERINE PREGNANCY. By W. Anstruther Milligan, M. S., F. R. C. S. (Edin.).

The writer says that "ectopic pregnancy is not common until after several (8–10) years of married life." Any question as to previous sterility has no significance in the weighing of the "pros and cons" of an extrauterine gestation. In these cases, the average number of previous pregnancies was 4 and the average time since last pregnancy was 4½ years, which, according to his belief, would not permit the woman to be classified as sterile. "Extrauterine gestation is more common in multiparous women, and is more likely to follow a full-term pregnancy than a miscarriage or an abortion." In eight of the writer's cases it occurred in the first pregnancy. In discussing the diagnosis, he divided the subject thus:

1. What the patient tells: (*a*) In her own words; (*b*) In answer to more minute inquiry.

2. What may be expected to be found on examination.

3. The most likely things that may be confused with an extrauterine pregnancy.

"That some irregularity in the way of hemorrhage discharge is an important, some say invaluable, symptom, there is no doubt. The chief point to elicit is, whether or not, if no period has been missed, the bleeding has come on with pain, like the bleeding of an ordinary period, or whether it is different, and if so, in what does it differ." "Should a period of amenorrhœa have preceded the hemorrhagic discharge, then the same points have to be determined as in those cases when there has been no amenorrhœa." These points are: 1. The color; 2. The persistence; 3. The presence of membranes or pieces of membranes.

OVARIAN PREGNANCY, WITH AN ACCOUNT OF A HITHERTO UNPUBLISHED CASE. By James K. Kelly, M. D., F. F. P. S. G., and A. Louis McIlroy, M. D. (Glasg.), L. M. (Rot. Hosp.).

In the introduction, the authors say: "The fact that ovarian pregnancy occurs has been already sufficiently proved by the case of Kouwer and Van Tussenbroek, Thompson, and others," and their case reported in this article merely confirms this fact.

"The time and mode of detection of the pregnancy in this case suggests the thought that ovarian pregnancy may be more frequent than hitherto imagined. The occurrence of blood-cysts in the ovary are common. These cysts are rarely examined for pregnancy." It is suggested that a series of cases be examined by competent pathologists to determine the frequency of pregnancy in these cysts. The authors report eight cases to further the proof of ovarian pregnancy. They then describe a case with well-illustrated microscopical drawings, and put forward the following points:

1. The whole ovisac is completely composed of ovarian tissue.

2. That the pregnancy has occurred within a Graafian follicle is proved by the presence of lutein cell tissue almost directly adjoining the fœtal epiblastic structures, but separated from it by a layer of fibrin and connective tissue, thus proving the connective tissue as the normal tissue for the imbedding of the ovum, whether intra or extra uterine.

3. No rupture has taken place in the blood mass, but the point of least resistance is to be found at the lower thinned out portion, where the pressure of the blood mass has been greatest.

[1] From the *Journal of Obstetrics and Gynecology of the British Empire*, June, 1906.

4. The fact that no decidual cell elements are found negatives the statement that pregnancy can take place only on tissue which has undergone some previous genetic influence.

5. The Fallopian tube is normal. Sections taken from near its abdominal end show ciliated epithelium. No decidual cells are found in the tube.

6. That the pregnancy has originated within the ovary is apparent; the tube is normal, and free from adhesions to the ovary. Ovarian tissue entirely surrounds the fœtal structures. No break in the continuity of the walls having taken place and the lutein cell envelope show that it is not a case of a fertilized ovum having burrowed its way into the ovarian stroma, but that the ovum has become fertilized while within its Graafian follicle.

A Clinical Experience of Ectopic Pregnancy and Allied Conditions. By F. W. N. Haultain, M. D., F. R. C. P.

"There is no more perfect clinical picture than that portrayed by a typical case of ectopic pregnancy. The diagnosis hardly requires the detection of physical signs," " but in other cases the diagnosis is not only difficult, but almost impossible."

The author gives four characteristic symptoms of ectopic pregnancy before rupture.

1. A variable period of amenorrhœa.
2. Irregular uterine hemorrhage.
3. Pelvic pain and discomfort.
4. Shedding of uterine decidua.

The association of these forms a typical case.

He reports 23 cases with the following history: Amenorrhœa was absent in 5; irregular hemorrhage was absent in 4; pelvic pain or discomfort absent in 4; shedding of decidua absent in 16.

The differential diagnosis between intraperitoneal bleeding from actual rupture from the sac, as opposed to escape from the ostium of the tube, is mainly to be based upon constitutional signs, particularly the temperature. The physical signs which develop from the ostial trickle consist in sudden severe hypogastric pain, particularly referable to the side, marked tenderness of the abdomen, and increased temperature; while in cases of rupture the symptoms of pain are associated with a distinct fall in the body heat and more evident of shock. In these cases the patient complained of marked epigastric tenderness and discomfort. When bleeding from abdominal ostium is excessively severe, the same symptoms will appear. Such conditions, however, are the exception.

"Bleeding through ostium, as a rule, is limited in amount, and is checked from a resulting local peritonitis. A definite pelvic swelling can be mapped out in a few hours. The acute symptoms subside, but the patient will, in the majority of cases, be subjected to a recurrence from a renewed extravasation of blood. This apparently normal condition frequently throws the medical attendant off his guard. Should death of ovum occur with a complete separation, the hemorrhage may permanently cease and the blood be absorbed." In exceptional cases, entire absorption occurs, and the tube is returned to its original patent state within a few months. In considering the treatment, he says: "A tubal pregnancy must be considered in the light of a malignant growth, and a continued menace to the life of the patient so long as it is present. The chief points which he wishes to emphasize are:

1. The difficulty of diagnosis from the irregularity of the signs and symptoms.
2. The frequency with which it is simulated by other conditions.
3. The ease with which it may be mistaken for an ordinary abortion, and the necessity for thorough pelvic examination in all such cases.
4. And lastly, but most urgently, the absolute necessity for removal as soon as even a probable diagnosis has been made.

Recent Work on Tubal Pregnancy. By Henry Russell Andrews, M. D., London.

Dr. Andrews had published two papers on tubal pregnancy, covering the subject up to October, 1902. He now writes a critical review of the work on tubal pregnancy from that time up to the present. The literature examined is chiefly German, 6 English papers, 2 American, and 2 French. He presents the subject under the following headings:

1. The anatomy of the pregnant lobe.

i. Decidual reaction.

(*a*) In the tubal mucous membrane.

(*b*) In the submucous and intermuscular connective tissue and musle; i. e., the wall of the gestation sac.

(*c*) In the walls of the maternal blood-vessels.

(*d*) In the surrounding tissues.

ii. The site of the gestation sac. The structure of the "capsularis."

iii. The relation of the fœtal ictodermal cells to the maternal vessels.

2. The causes of tubal abortion and rupture.

3. The ætiology of tubal pregnancy.

i. Heinsius defines a membrana decidua as follows: "A tissue consisting of a dense layer of enlarged connective-tissue cells with large nuclei, a tissue the function of which is to afford protection to both mother and ovum, clothing the whole neighborhood of the ovum."

Kermanner found decidual changes in the mucous membrane in only 6 cases out of 41. "He considers that tenseness and stiffness of the tubal mucous membrane have not been sufficiently noticed. They prevent the early occurrence of œdema which precedes and accompanies the characteristic swelling of the connective-tissue cells in decidual reaction."

The less marked the chronic inflammatory changes in the mucous membrane, the earlier will decidual reaction be seen, but its appearance will always be later in the tube than in the endometrium in intrauterine pregnancy, because these chronic inflammatory changes are never altogether absent.

"Fellner finds decidual reaction in the mucous membrane, and thinks that if there is no decidual reaction the ovum cannot go on developing."

"Von Franqué and Garkisch found much decidual reaction in the mucous membrane of all parts of the tube. They consider that a decidua capsularis and decidua basalis are found in the mucous membrane very early, but are soon destroyed by fœtal cells."

"Whitridge Williams found decidual formation not only at the site of implantation of the ovum, but also in folds of the mucosa some distance from it."

"Voigt is the only observer who has failed to find evidence of decidual change in the mucous membrane in any case. Kermanner found none in 35 cases out of 41, and Vassmer found none in 8 cases out of 20."

"Heinsius says: 'There is some decidual reaction in the maternal tissues; the musculature of the tube is loosened and œdematous, and the connective-tissue cells are swollen.'"

"Von Franqué and Garkisch describe decidual change in the cells of the intermuscular connective tissue. The nuclei were large and well stained, and the cell bodies swollen and decidua-like."

"Whitridge Williams says: 'I am confident that a decidual formation occurs, though to a far less marked extent than was believed by the early observers. The decidua serotina never occurs as a continuous membrane, but, at most, consists of a few patches of decidual cells, which can be distinguished from the more abundant fœtal cells only by the most careful examination.'"

"Kober considers that the cell-sheet is partly maternal."

"Krömer says: 'It is interesting to notice that even the muscular fibers and interstitial connective-tissue cells swell in a decidual manner, and show large clear vesicular characters when in contact with masses of syncytium.'

"Berkeley and Bonney agree with Kühne that the cells in the 'decidua serotina' are fœtal, and not maternal."

"Runge says that the proliferated in the wall of the gestation sac are not decidual cells nor proliferated epithelium, but certainly Langhans cells."

"Schambacher agrees with Kühne's interpretation of the cell-sheet, and finds no decidual cells except in the walls of vessels."

Heinsius explains variation in observation thus:

1. Individuality of the tissues, the varying energy of the fœtal tissues, and the varying reaction of the maternal tissues.

2. The site of the ovum. The nearer to the fimbriated extremity is the spot at which the ovum is implanted, the more marked is the reaction of the tissues.

3. The stage of development of the ovum.

4. The time that has elapsed between interruption of the pregnancy and removal of the tube.

Regarding the decidual reaction in the walls of the maternal blood-vessels, the author says: "Kermanner found undoubted proliferation of the endothelium in some cases, and Krömer describes synyctial change in it: but the endothelium no longer occupies the place of interest — this has been taken by the cells of the intima."

"Hitschmann found that the cells of the tunica intima of some of the arteries had undergone a decidua-like proliferation."

What has been described as deportation of Langhans cells into veins is really formation of decidual cells in arteries. Schambacher found that the walls of some of the vessels were infiltrated with large cells of decidual character, quite distinct from Langhans cells. They could be differentiated from the latter, because they were two or three times the size of Langhans cells, of a different shape, and often contained two or three or more nuclei. They were separated by a good deal of intercellular substance, which is not seen in clumps of Langhans cells. By tracing vessel-walls in serial sections, these decidual cells could be proved to arise from cells of the intermuscular tissue of the vessel-walls, and particularly from the intima, under endothelium, which often was unaltered. As these cells increased in quantity, the muscle and elastic tissue of the vessel-wall disappeared.

"Kermanner, Von Franqué and Garkisch, Hitschmann, Fellner, Krömer, found cells like those described by Schambacher."

"Few writers recently have paid much attention to the changes in the peritoneum. Berkeley and Bonney found no decidual cells in the ovum, in the opposite tube, or in the peritoneum. Krömer and

Whitridge Williams each found decidual changes in the tube of the other side, in one case."

The author says that a case of tubo-abdominal pregnancy reported by Penckert strengthens the view that primary abdominal pregnancy may occur.

"Concerning the uterine decidua in tubal pregnancy, Cageaux considers that in every case there is a reaction in the endometrium which undergoes profound changes during the development of the ovum. This reaction is variable, and more marked the nearer the site of ovum to the uterus."

Kermanner thinks that it is not absolutely proved that a uterine decidua is always found in tubal pregnancy.

The author says that the work of Peters on the imbedding of the ovum in the uterus and that of Füth on imbedding in the tube are almost universally accepted; the chief difference of opinion being as to the means by which the ovum sinks to such a depth in the tissues of the tube.

Veit says the ovum can occupy only pre-existing cavities in the tube-wall, and cannot destroy maternal tissue. Krömer upholds this view to a certain extent.

The larger majority of observers are agreed that the site of the ovum is intramuscular.

Whitridge Williams says: "The ovum penetrates the surface epithelium and burrows down into the tissue beneath."

Heinsius says that in what will be the placental site the muscle is destroyed, looking as if it had been eaten out.

Füth says the ovum undoubtedly enters the tubal tissues by its own activity.

"Vassmer and Raschkes agree that the fœtal cells destroy or cause atrophy of the tubal muscle. The presence of a partition sheet or capsularis containing muscle, thus proving the deep intramuscular site of the ovum, has been frequently noted."

"The deep site of the gestation sac is, in some cases, partly due to imbedding of the ovum in a diverticulum. Fellner considers that this explains the deep intramuscular site more easily than the theory of the pseudo-malignant action of the trophoblast, which he refuses to accept."

"Fellner considers that imbedding in a diverticulum is the rule, but is not certain whether the ovum bores its way into the wall of the diverticulum or not."

Micholitsch describes ten cases in which the ovum was imbedded in a diverticulum. (Kermanner challenges every one of these ten cases.)

"Kermanner did not believe that imbedding in a diverticulum had been proved in any case. He thinks that columnar imbedding, i. e., imbedding in a fold of mucous membrane, does not occur, but that the ordinary method of imbedding is intercolumnar, between two folds."

All observers, except Veit and Krömer and Fellner, are agreed that the maternal tissue is destroyed by the trophoblast. As proof of this destructive action, in the cases reported the trophoblast had grown through the capsularis and attacked the tube-wall on the other side of the lumen.

The author sums up the appearances in the maternal tissues forming the wall of the gestation sac according to Von Franqué and Garkisch: "Swelling fibrous degeneration, and finally breaking down of the muscular fibers which are in direct contact with Langhans cells."

The author quotes Veit as refusing to admit that the trophoblast exercises a destructive action on the walls of vessels. Veit says that the villi and trophoblast are not found in arteries, but only in veins into which they are carried by the force of the blood stream; i. e., by deportation.

Several observers have noticed "deportation," but look upon it as a secondary result of the destruction of vessel-walls by trophoblast.

Hitschmann finds that the trophoblast actively opens up maternal vessels by destruction of part of the walls. Most deported villi are still in direct connection with the chorion; there is no solution of continuity.

The writer claims "the bulk of the evidence is in favor of the view that the fœtal cells act in a malignant or pseudo-malignant manner toward the maternal tissues, in somewhat if not exactly the same way as do the cells of a chorio-epithelium—the difference seems to be one of degree only, not of kind."

The three factors involved in causing abortion or rupture, apart from such extravenous causes as bimanual examination, etc., are:

1. The destructive action of the trophoblast.
2. Bleeding.
3. Contraction of the muscular wall of the tube. The author and Von Franqué and Garkisch consider the rupture due to destructive action of the trophoblast.

According to most authors, bleeding into sac is due to a destruction of the vessel-wall by the growth of the ovum; i. e., by trophoblast.

Veit says bleeding is due to congestion caused by blocking of veins by deported villi.

Whitridge Williams says "the underlying causes of rupture are perforation of the tube-wall by the growing villi, or acute overdistention as a result of hemorrhage into a tube whose fimbriated end is occluded."

"Runge considers that the amount of reaction in the muscle of the tube-wall, not simply hypertrophy, but also hyperplasia, must help to determine whether the rupture shall be internal or external. If well-marked hyperplasia is present, there will be internal rupture; if the reaction is less well developed, external rupture will occur."

"Heinsius is doubtful as to the importance of muscular contraction in the causation of abortion and rupture. He considers that the severity of the bleeding is due to the fact that the damaged muscle cannot contract."

The author says that "intraligamentary rupture is a rarer occurrence than is generally supposed. One might theorize on the subject, suggesting that the loose connective tissue of the mesosalpinx could undergo decidual reaction, and so resist a threatened rupture, but if the intervillous space were opened into the mesosalpinx, a great amount of decidual formation would be necessary to prevent escape of blood into the tissues, and we have no evidence that such decidual reaction occurs in the connective tissue of the broad ligament."

Regarding the ætiology of tubal pregnancy, the writer looks upon diverticula as one of the least certainly proved causes of tubal pregnancy. "Cases in which the pregnancy is of more than a few weeks' duration, or not investigated by the aid of serial sections, are practically useless for purposes of demonstrating imbedding in the diverticulum."

Heinsius says that "it has been proved that in tubal pregnancy the ovum *may* be imbedded in a diverticulum, but it is by no means proved that it *must* be so imbedded."

Kermanner thinks there is undoubtedly some connection between salpingitis and tubal pregnancy, but cannot say what it is.

Noble, Runge and Urich, and Gottschalk look upon salpingitis as an important cause of tubal pregnancy.

Berkeley and Bonney found no evidence of salpingitis in their cases.

"Hitschmann and Lindenthal suggest that the ovum can only plant itself at a certain stage in its development, and that the cause is that the passage of the ovum has been delayed in some way, so that it is still in the tube when this stage is reached."

The writer says that "beyond an occasional diverticulum or the presence of a mucous polypus to arrest the progress of the ovum, our knowledge as regards the ætiology of tubal pregnancy is most unsatisfactory."

Syphilis of the Placenta. By V. Wallich and C. Levaditi.

These writers take the discovery by Schoudinn and Hoffmann of the spirochæte pallida as the foundation of their researches. They ask the questions, whether the discovery of the spirochæte in the placenta goes to prove the presence of specific disease, hidden, unknown, or denied on the part of the parents; also, if this discovery enables one to announce before their appearance the early or late symptoms of hereditary syphilis. Their paper is based on a study of thirteen placentæ, six in which syphilis was established without doubt; the source being traced to the father in two cases, to the mother in two, and twice, also, the fœtus or new-born giving certain evidence. In the other seven cases, specific infection was simply conjectured, sometimes because of the excessive weight of the placenta, and sometimes from the history of a series of macerated fœtuses expelled at term or prematurely. The typical appearance of the syphilitic placenta, microscopically and in gross specimen, is described briefly. Reference is made to Paaschen's placental preparation showing the spirochæte, and also to the case of Menetrier and Rubens-Duval, a child presenting hereditary plantar and palmar syphilidæ, while the placenta contained the spirillæ in great numbers. The writers agree with these investigators, that the spirochæte pallida exists exclusively in the vessels and blood of the villi. In this series of thirteen cases the spirillæ were found in but one placenta. This showed no atypical changes microscopically, weighed 450 grams, and a considerable number of the spirochæte pallida were found in the blood of the intervillous spaces and in the decidua, particularly in those decidual prolongations extending well into the placenta. The babe died on the second day, and, upon autopsy, revealed characteristic changes. The liver was large and hard, bluish red, sprinkled over its surface with small white sclerotic areas. The spleen was very large, brown in color, harder than normal. The kidneys showed no changes, the suprarenal capsules were somewhat hypertrophied. The lungs were negative. The skin of the palms, and especially that of the soles of the feet, was covered with the bullæ of pemphigus.

The one definite conclusion, as a result of these observations, is, that, up to this time, the spirocheta has been found in those placentæ only where syphilis is present in the fœtus.—"*Recherches sur la syphilis du placenta*," *Annales de Gynéc. et d'obstet.*, Feb., 1906. Carey Culbertson.